TORREYA

A Monthly Journal of Botanical Notes and News

JOHN TORREY, 1796-1873

EDITED FOR

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BY

JEAN BROADHURST

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ERRATA, VOLUME 8

Page 29, 2d line from bottom, *for* **305** *read* 305.

Page 48, 4th line, for *Corprinus* read *Coprinus.*

Page 49, title of picture, omit *comma* after *Saxifraga.*

Page 50, 11th line, for *Grimmias* read Grimmias.

Page 50, 13th line, for *Galiums* read Galiums.

Page 84, 19th line, *complete the brackets.*

Page 86, 3d line, *for* It *read* "It.

Page 86, 13th line, *for* size *read* size".

Page 86, 21st line, *substitute* semicolon for *comma after* D. C.

Page 94, 6th line, *for* f *read* If.

Page 97, 5th line from bottom, *for* **Hicoria glabra** *read* HICORIA GLABRA.

Page 98, 6th line from bottom, for **Juglans nigra** *read* JUGLANS NIGRA.

Page 104, 5th line, *omit* comma *after* included.

Page 136, 4th line, *for* Frond *read* "Frond.

Page 136, 13th line, *for* Rootstock *read* "Rootstock.

Page 139, 1st line, *for* figures 6, 7, 8, and 9 read *figures 6, 7, 8, and 9.*

Page 155, 19th line, *for* **Rhipsalis Cassutha** *read* RHIPSALIS CASSUTHA.

Page 156, 20th line, *for* **Rhipsalis alata** *read* RHIPSALIS ALATA.

Page 160, *for* Sept. 21, 1908, *read* Sept. 21, 1907.

Page 160, *for* Symposium of 1909 *read* Symposium of 1908.

Page 161, 12th line from bottom, for *Gymnopogon ambiguus* (Mx.) B.S.P. read *Gymnopogon brevifolius* Trin.

Page 162, 15th line, for *Pogonia diviricata* read *Pogonia varicata.*

Page 164, 13th line from bottom, before *Pyrola secunda* L. insert *Aralia spinosa* L. Georgetown.

Page 164, 9th line from bottom, for *Gentiana puberula* Mx. ? read *Gentiana Elliotii* Chapm. (fide Britton).

Page 167, 10th line, for *Wedeliella* read **Wedeliella.**

Page 167, 14th line, for *Wedeliella cristata* read **Wedeliella cristata.**

Page 167, 15th line, for *Wedeliella glabra* read **Wedeliella glabra.**

Page 167, 16th line, for *Wedeliella incarnata* read **Wedeliella incarnata.**

Page 167, 18th line, for *Wedeliella incarnata anodonta* read **Wedeliella incarnata anodonta.**

Page 167, 20th line, for *Wedeliella incarnata villosa* read **Wedeliella incarnata villosa.**

Page 167, 22d line, for *Wedeliella incarnata nudata* read **Wedeliella incarnata nudata.**

Page 173, 16th line, for *Fuscraea* read *Furcraea.*

Page 174, 10th line from bottom, *for* Paoso *read* Paso.

Page 180, 3d line, *omit* comma *after* it.

Page 200, 3d line from bottom, *supply* comma *before* and.

Page 212, 13th line, for *Eyrthronium* read *Erythronium.*

Page 218, 2d line, *omit* comma *after* species.

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TORREYA

January, 1909

Vol. 9. No. 1.

A NEW GENUS OF FOSSIL FAGACEAE FROM COLORADO *

By Arthur Hollick

Among the many beautifully preserved specimens of fossil plant remains from the Tertiary shales of Florissant, Colorado, sent to me for examination by Professor Theodore D. A. Cockerell, are the two here figured. They present the rare combination of leaves and fruit, the latter in different stages of development, attached to their respective branches, thus enabling us to identify the several parts as belonging to one and the same species.

Detached leaves of this species are abundantly represented in the shales, and years ago these were described and subsequently figured by Lesquereux under the name *Planera longifolia* ; † but the correctness of their reference to this genus has generally been regarded as questionable by those who had occasion to critically examine them. The nervation of the leaves is not typical of *Planera*, and the characters of the fruit, now found unmistakably associated with them, demonstrate beyond question that the original generic identification was erroneous. In view of these circumstances it therefore becomes advisable to determine, if possible, the correct botanical affinities of the remains and to redescribe them in the light of our newly acquired information concerning them.

The fructification is, superficially, so strongly suggestive of the Fagaceae that it is difficult to resist the conviction that relationship at least with this family is clearly indicated, and the leaves

* Illustrated with the aid of the McManes fund.

† Sixth Ann. Rept. U. S. Geol. Surv. Terr. 1872: 371. 1873. Rept. U. S. Geol. Surv. Terr. 7 (Tert. Fl.): 189. *pl. 27. f. 4–6.* 1878.

[No. 12, Vol. 8, of Torreya, comprising pages 277–315, was issued January 6, 1909.]

also are fagaceous in their general characters; but I have failed to make entirely satisfactory comparison with similar parts of species in any existing genus of the family; although several paleobotanical writers have referred certain fossil leaves more or less similar to ours in nervation and dentition to *Fagus* and *Castanea*.*

Taking all of these facts into consideration, therefore, the course which appears to be least open to objection is to regard the specimens as belonging to a species of an extinct fagaceous genus and to redescribe it under a new generic name.

Fagopsis longifolia (Lesq.) comb. nov.

Planera longifolia Lesq., Sixth Ann. Rept. U. S. Geol. Surv. Terr. **1872**: 371. 1873.

Fagus longifolia (Lesq.) Hollick and Cockerell, Bull. Amer. Mus. Nat. Hist. **24**: 88 (footnote). 1908.

General arrangement of growth of leaves and fruit on terminal branchlets similar to that of *Fagus Americana* Sweet; leaves

Fig. 1. *Fagopsis longifolia* (Lesq.) Hollick. Nat. size showing immature fruit.

* *Fagus dentata* Goepp. Paleontogr. **2**: 274. *pl. 24. f. 3.* 1852; Heer, Fl. Foss. Arct. **1**: *pl. 10. f. 2, 7b, 9;* Gaudin and Strozzi, Mém. Gisem. Feuilles Foss. Toscane **1**: *pl. 6. f. 5; pl. 7. f. 1.*

Fagus castaneaefolia Ung., Synops. Plant. Foss. 218. 1845; Chlor. Prot., 104, *pl. 28. f. 1.* 1847; Heer, *l. c.*, *f. 7a, 8.* (= *Castanea castaneaefolia* (Ung.) Knowlton, Bull. U. S. Geol. Surv. No. 152, 60.) Etc.

elliptical-lanceolate in outline; margins coarsely and regularly crenate or bluntly dentate, nervation strictly craspedodrome, the secondary nerves almost parallel, each one terminating in the apex of a marginal dentition; fruit apparently single, on a

FIG. 2. *Fagopsis longifolia* (Lesq.) Hollick. Nat. size showing mature fruit.

stout, short peduncle, somewhat ovoid in shape and covered with spinous bracts when immature; globose, rough, and apparently destitute of bracts when mature.

Tertiary shales, station 14, Florissant, Colo., June, 1907.

Figure 1, specimen collected by Mrs. T. D. A. Cockerell. Figure 2, specimen collected by T. D. A. Cockerell.

Specimens in Museum N. Y. Bot. Gard.

NEW YORK BOTANICAL GARDEN

THE RUST OF TIMOTHY*

BY FRANK D. KERN

Timothy rust was reported from this country as early as 1881 or 1882 by Trelease in the Transactions of the Wisconsin Academy of Science † but it is only in very recent years that it has been found in sufficient abundance to attract much attention or to be the cause of any alarm. Except for this single report, rust on timothy has been so rare in this country that its previous existence might almost be questioned. In 1906 a fairly abundant amount was observed at one or two localities in New York, and in 1907 it was reported from Delaware, West Vir-

* Read before the Indiana Academy of Science at the Thanksgiving meeting, Purdue University, November 27, 1908.

† Preliminary List of Wisconsin Fungi, Trans. Wis. Acad. Sci. 7: 131. 1885.

ginia, and New York again, and also from two localities in Ontario, Canada. In New York it was rather common, having been collected in eight or more localities in different parts of the state. 1908 has added Michigan to its list and Wisconsin has reported it again. It is seemingly increasing in its distribution and occurring in much greater abundance.

This spread of a fungous disease on a crop of great importance has caused some anxiety concerning its identity and nature. This has led to some investigation concerning it. In the first place the American and European forms are undoubtedly identical and represent the same species. In the gross appearance of the sori and in the microscopical details of both the summer spores (*urediniospores*) and winter spores (*teliospores*) the species is indistinguishable from the black rust of cereals, *Puccinia poculiformis* or *Puccinia graminis*, as it is better known. In 1894 Erikson and Henning separated the timothy rust as a distinct species, *Puccinia Phlei-pratensis*,* on the grounds that their artificial cultures showed that it probably does not form its aecial stage on the barberry (*Berberis*). An examination of their original report shows, however, that out of nine trials (five in 1892, and four in 1893) while eight gave negative results, one gave a positive result showing pycnia in 16 days and developing aecia in 16 days more. It is noted that the cups formed were unusually small. During the present season eight unsuccessful inoculations on barberry were observed by the writer. Several seasons' experience with the cultures has shown that negative results are not always to be relied on; they may indicate lack of proper conditions or that infection does not take place readily. The one positive result mentioned ought, it seems, be accorded more weight than all the negative ones together, and proves that it does, even if with difficulty, form its aecial stage upon the barberry. The conclusion is that the timothy rust may be considered a race of *Puccinia poculiformis*, or a so-called physiological species, differing from the typical from in having somewhat smaller aecial cups and in the somewhat smaller size of

* Die Hauptresultate einer neuen Untersuchung ueber die Getreideroste, II. Zeits. f. Pflanzenkr. 4: 140. 1894.

the hyphae of the uredinial mycelium as cytological studies have shown, but there is no positive evidence to show that it can be regarded as a distinct species.

Knowing the taxonomic relationship, it may be predicted with reasonable certainty that there is not much danger of the rust transferring to timothy from the other cereals and grasses. It may be expected to become more general in its distribution and may locally do considerable injury; but in spreading it will be limited, chiefly if not entirely, to passing in the summer spore (*uredinial*) stage from timothy to timothy.

Purdue University,
Lafayette, Indiana

ABERRANT SOCIETIES OF SANGUINARIA AND TRILLIUM

By Roswell H. Johnson

Several years ago, in the course of biometric studies on some of our wild flowers, I determined the variation in the number of petals of *Sanguinaria Canadensis* L., the bloodroot, for several localities. One of these localities gave results so aberrant that it seems desirable to place it upon record.

The manuals give the number of petals as 8–12 but always figure it with 8 petals. Dr. Cheney, formerly of the University of Wisconsin, informs me that the modal number is eight in every one of the localities in which he has seen it in that state. The following table gives my results, with a count from Milwaukee, Wisconsin, for which I am indebted to Dr. P. H. Dernehl.

Place	Year	No.	6	7	8	9	10	11	12
Yonkers, N. Y.	'99	102	0	0	18	18	16	25	24
Alpine, N. J.	'99	171	3	2	165	1	0	0	0
Glencoe, Ill.	'00	75	0	2	73	0	0	0	0
Milwaukee, Wis.	'02	103	0	1	98	2	2	1	0
Stony Brook, Mass.	'99	4	0	0	4	0	0	0	0
Blue Island, Ill.	'00	8	0	0	8	0	0	0	0
Eagle Heights, Wis.	'02	5	0	0	5	0	0	0	0

It is evident that in general any other number than 8 petals is a rarity. The society in Yonkers where the count was made is, therefore, a remarkably aberrant one, presenting a polygon of

frequency of a peculiar character. The locality was a wooded slope in the area bounded by Midland, Yonkers, Jerome, and McLean Avenues. I have sent this note to TORREYA in the hope that some of the local botanists may care to make counts of this species in other surrounding *Sanguinaria* localities and investigate the nature of this peculiar society.

I am reminded, in this connection, of a similar aberrant society of *Trillium grandiflorum* Salisb. near Williamsville, Erie Co., N. Y. This grove contains an unusually large number of cases of acaulescence, petiolate leaves, and sepalody of the petals. These variations are all known in *Trillium grandiflorum*, but they are really common in this particular society.

BARTELSVILLE, OKLAHOMA

REVIEWS

Thaxter's Contribution toward a Monograph of the Laboulbeniaceae. Part II*

Part II of Professor Thaxter's monograph of the Laboulbeniaceae is a handsome work of 251 quarto pages and 44 plates and is throughout, as it is almost superfluous to remark, of the same high quality that characterized the first part of the monograph, published about twelve years ago. The growth of our knowledge of these small fungous parasites on insects and the manner in which Professor Thaxter has made this special field peculiarly his own is well illustrated by the fact that when he began his studies of the Laboulbeniaceae eighteen or twenty years ago the group in the world as a whole was credited with six described genera (four of them valid) represented by fifteen described species, of which only one was from North America. The present contribution brings the number of described species and varieties up to about five hundred, distributed in more than fifty genera, and the author intimates that during the progress of the work more than one hundred additional new species have accumulated, which must await elaboration at some future time. And this expansion is due in very slight measure to any change

* Thaxter, R. Contribution toward a Monograph of the Laboulbeniaceae. Part II. Memoirs of the American Academy of Arts and Sciences 13: 219–469. *pl. 28–71.* Je 1908.

in point of view as to the taxonomic arrangement of previously known forms; practically all of the forms described as new have been hitherto absolutely unknown. In the first part of the monograph, printed nearly twelve years ago, the number of known species is given as 158, of which 130 were North American and 19 were European. No summary is given in the present part, but while North America is still apparently in the lead in the number of recognized species, its overwhelming preponderance has doubtless been relatively reduced by an increased knowledge of the Laboulbeniales of the other parts of the world. Professor Thaxter has twice visited Europe for the purpose of examining collections of insects in London, Oxford, Cambridge, Berlin, and Paris, and many exotic species of Laboulbeniales thus detected are here described and figured. His own extensive collections of these entomophilous fungi in South America in 1905–6 still remain to be described.

Professor Thaxter devotes a page to refuting Cavara's contention that the Laboulbeniales are essentially saprophytes rather than parasites, his conclusion being that although "the growth of these plants is not associated with any appreciable injury to the host, it is nevertheless a true parasitism of a typically obligate type." As to the details of the phylogeny of the group, the author of the monograph modestly and refreshingly "confesses his complete agnosticism in these matters, an agnosticism which embraces the question of the origin of the Ascomycetes as a whole, and the determination of the course of evolution in the entire fungus series." His conclusion as to the taxonomic position of the group is summed up as follows: "As to the Laboulbeniales, it may be said with safety that they resemble the Florideae in some repects more closely than they do any other plants, while at the same time they are more surely Ascomycetes than many forms included in this group, and the writer sees no sufficient reason why they should not be placed in the Pyrenomycetes, as a group coördinate with the Perisporiales, Hypocreales, etc."

A slight bibliographical defect in Professor Thaxter's monograph is the fact that the contribution which now, apparently, we

are to consider "Part I", itself consists of a "Part I" and a "Part II", so that some such citation "Thaxter, Monog. Laboulbeniaceae, Part II, pp. 251–396" might possibly be interpreted as referring to the contribution of twelve years ago as well as to that of the present year. But, of course, no one ought to quote the work in any such fashion. If the Memoirs of the American Academy of Arts and Sciences are cited, as they should be, any such trifling chance of ambiguity will be obviated.

That such a notable extension of human knowledge as is evidenced in Professor Thaxter's monograph has been the work of an American scholar, must always remain a source of pride to American botanists. In connection with a contribution of this kind, it occurs to the reviewer to remark that the fungi parasitic on marine algae are still practically unknown and that though they are probably much less numerous than those parasitic on insects, they offer a field that is well worthy of the attention of mycologists.

Marshall A. Howe

PROCEEDINGS OF THE CLUB

November 25, 1908

The meeting was called to order at the Museum Building of the New York Botanical Garden at 3:40 p. m., with Dr. M. A. Howe in the chair. There were 14 persons present. The minutes of the meeting of November 10 were read and approved.

The resignation of Dr. Valery Havard, dated November 8, 1908, was read. A motion was made and carried that the resignation of Dr. Havard be accepted and that his name be transferred to the list of corresponding members.

There was no announced scientific program for this meeting, but the following communications were made:

Dr. Britton showed fruits of the rare and local tree, *Prioria copaifera* Griseb., which he collected in company with Mr. William Harris, at Bachelor's Hall, Jamaica, near where it was originally discovered sixty years ago by Nathaniel Wilson who

sent it to Grisebach. *Prioria* is one of the largest trees of Jamaica, sometimes attaining a height of ninety feet, and is a member of the senna family. So far as is known, this tree is found only on two estates in Jamaica, and grows at an elevation of from five to six hundred feet. This species is characterized by having a one-seeded legume, which is indehiscent. The genus *Prioria* is reported to be represented also in the Republic of Panama.

Dr. Murrill displayed photographs and colored drawings of several of the larger local fungi. He also explained reproduction of colored drawings by the four-color process. This process seems to be the most satisfactory for representing fungi in colors.

Mr. Nash exhibited a living plant of *Dendrobium Coelogyne*, a rare orchid from Burma, which has just flowered in the conservatories of the New York Botanical Garden. Specimens of *Coelogyne* and of other species of *Dendrobium* were also shown to illustrate the characters of these two genera. While the flowers of *Dendrobium Coelogyne* resemble those of a *Dendrobium*, the habit is that of a *Coelogyne*.

The Club adjourned at 4:30 P. M.

Percy Wilson,
Secretary

December 8, 1908

The meeting was held at the American Museum of Natural History, President Rusby in the chair. About seventy-five persons were present. After the reading of the minutes of the preceding meeting, the following persons were elected to membership: Miss Jane R. Condit, 1230 Amsterdam Ave., New York City; Mrs. H. Mark Thomas, 239 West 103d St., New York City, and Professor Guy West Wilson, Upper Iowa University, Fayette, Iowa. The announced scientific paper of the evening on "Mechanical Response of Plants" was then presented by Sir Jagadis Chunder Bose, professor in the Presidency College of Calcutta and author of "Response in the Living and Non-Living", "Plant Response as a Means of Physiological Investigation", etc. The presentation of the subject was accompanied by an exhibition of some of the ingenious and delicately contrived apparatus constructed by Professor Bose for the purpose of

measuring and recording the responses of plants to various stimuli. Following is an abstract of the paper compiled from notes furnished by Professor Bose:

The effect of stimulus impinging on a responding tissue is to induce a fundamental molecular derangement. This condition of derangement constitutes excitation. On the cessation of stimulus, there is a slow recovery, the tissue returning to its original condition. This molecular reaction is itself beyond our scrutiny, but it may be shown that we can gauge its intensity and extent by the observation and record of certain concomitant changes induced by it in the responding tissue. Amongst these are (1) changes of form, manifested as mechanical response, and (2) changes of electrical condition, which may be recorded as electrical response.

The intensity of the responsive change will obviously depend on the two factors of strength of stimulus and physiological condition of the tissue. Hence, when stimulus is constant, the amplitude of response gives us a measure of the physiological condition. Now we know that the changing environment must induce unknown changes in this physiological condition, of which there is no outward sign. But we are here enabled to make the plant itself reveal its condition, by the reply it makes to the blow of a stimulus. A stimulating agent will exalt, and a depressing agent diminish or abolish, this response. We have thus a means of attacking the deeper problem of the physiological variation in an organism.

The speaker had been able to overcome the numerous difficulties which occur in connection with the automatic recording of the mechanical response of the plant, by devising three types of instrument. These are (1) the oscillating recorder, (2) the optical lever, and (3) the balanced crescograph.

In the oscillating recorder, the recording lever is made of light aluminum wire and is suspended vertically on jewelled bearings. This lever is L-shaped, and the shorter arm, at right angles to the longer, is attached to the responding leaf. The great advantage conferred by the oscillating recorder lies in the fact that the friction of the writing point against the recording surface is prac-

tically eliminated. The source of friction in such arrangements arises from permanence of this contact. In this instrument, however, the writing lever is virtually free, except for the brief intervals in which the smoked glass surface is brought into periodic contact with it. For these records, the glass surface moves in a vertical plane by means of clockwork, and a minute oscillation to and fro is given to it by the agency of an electro-magnetic arrangement. The period of this oscillation is, say, one fifth of a second, and the record is thus made to consist of a series of dots, separated by time-intervals of one fifth of a second. Thus we can see the time-relations of the curve at a glance.

For responsive movements of minute leaflets the speaker employed the optical lever. By use of this a very high magnification is possible. The record is made on a traveling photographic plate by the spot of light reflected from the optical lever, connected with the responding plant.

For the instant detection of the effect of stimulus on the rate of growth, the balanced crescograph is used. Here a balanced and stationary point of light undergoes a sudden movement up or down, according as the rate of growth is enhanced or depressed by the action of an external agent.

In order to study the effects of external agencies on physiological excitability, it is first necessary to obtain a series of normal responses under stimuli of uniform intensity and duration, applied at regular predetermined intervals. This is accomplished by means of the automatic stimulator, in which an expansible fan periodically closes the exciting circuit. The intervals between successive applications and the period of stimulation are, in this instrument, capable of adjustment at will.

In a complete curve of response of the sensitive leaf or leaflet of *Mimosa* or *Biophytum sensitivum*, we find (1) a short horizontal line representing the latent period, (2) an up-curve showing attainment of maximum reaction; followed by (3) a down-curve representing the recovery. The latent period in a vigorous *Mimosa* is about .24 of a second. The effect of fall of temperature or fatigue results in the prolongation of this latent period to .3 of a second in the former, and .58 in the latter case. The maximum fall of

the leaf is attained in 1.5 seconds. Complete recovery takes place in 6 minutes in summer, and in 18 minutes in winter. In a leaflet of *Biophytum* the maximum fall is attained in .5 of a second and full recovery is reached in 3 minutes. The excitatory fall of the leaf takes place when stimulus is applied at or near the responding point. Seen from different points of view, this reaction will appear as a diminution of turgor in the pulvinus, constituting a negative turgidity-variation ; or a shortening or contraction of the more excitable lower half of the pulvinus. Electrically speaking, this reaction will have its concomitant in an electrical variation of galvanometric negativity. It is convenient to include all these excitatory symptoms together, under the single term *negative response.* Here, however, we may describe a responsive change of precisely opposite character, which takes place under definite conditions. This *positive response* consists of an erectile movement of the leaf, a positive turgidity-variation, expansion, and an electrical change of galvanometric positivity. The occurrence of this positive response may be demonstrated, in *Mimosa*, by applying stimulus at a point distant from the responding organ. In a certain experiment this positive or erectile response occurred .6 of a second after the application of the stimulus, and was followed, 2.8 seconds later, by the normal excitatory fall of the leaf. Here we have a response which is *diphasic*, positive followed by negative. When stimulus is moderate, and applied at a still greater distance, the response evoked is positive alone. These facts obtain universally, and from them we derive the following law of direct and indirect stimulation :

The effect at the responding-region of a strong stimulus transmitted to a short distance, or through a good conducting channel, is negative. The effect transmitted to a great distance, or through a semi-conducting channel, is positive.

Responsive movements, like those of the "sensitive" plants so-called, can be detected also in ordinary plants. It will be noticed, in *Mimosa*, that the responsive movement is made possible by the unequal excitability of the upper and lower halves of the pulvinus, the movement being determined by the greater shortening or contraction of the lower. If now we take a hollow tubu-

lar organ of some ordinary plant, say the peduncle of daffodil, it is clear that the protected inner side of the tube must be the more excitable. When this is cut into the form of a spiral strip, and excited by means of an electrical shock, we observe a responsive movement to take place by *curling*, due to the greater contraction of the inside of the strip. This mechanical response is at its maximum at that season which is optimum for the plant. When the plant is killed, its response disappears.

In *Mimosa*, under continuous stimulation, there is a fatigue-reversal, the responsive fall being converted into a movement of erection. The same thing happens in the response of ordinary plants, when the first contractile movement of the spiral, for instance, is reversed, under continuous stimulation, to an expansive uncurling.

An important series of observations is that on the modification of response by the tonic condition of the tissue. When the condition is sub-tonic, response is by the abnormal positive, instead of the normal negative, reaction. A strong or long-continued application of stimulus, however, converts this abnormal positive into normal negative.

Another important phenomenon is that for which the name of *multiple response* has been suggested. When the stimulus is very strong, the response is often not single, but repeated, or multiple. Excess of stimulus is thus seen to remain latent in the tissue, for rhythmic expression later. This storage of energy from the environment may in some cases be so great as to cause the continuance of rhythmic activity, even in the absence of immediate stimulation. We thus obtain a natural transition into so-called spontaneous or autonomous movements.

The various peculiarities of the spontaneous movements exhibited by *Desmodium gyrans*, or the telegraph plant, may be studied in the automatic record taken by the optical lever. The rhythmic tissues of the plant are then found to have characteristics which correspond to those of similar tissues in the animal. Lowering of temperature enhances the amplitude and diminishes the frequency of pulsation in the rhythmic cardiac tissue of the animal. The same is found to be true of the pulsatory activity of

Desmodium gyrans. The effects of various drugs are also very similar. The first result of the application of an anaesthetic like ether is to evoke a transient exaltation, followed by depression and arrest. Poisonous gases also induce a continuous depression of activity. A strong poisonous solution, again, induces a rapid arrest of pulsation.

It has thus been shown that by the waxing and waning of response, the variations in the plant's physiological activity, under changing external conditions, may be gauged. It has been shown also how numerous and varied are the factors that go to make up the complexity of plant-responses. It has been shown that stimulus may be modified in its effect, according as it is direct or indirect, and feeble, moderate, or strong. The modifying influence of the tonic condition of the tissue has also been shown, according as this is normal, sub-tonic, or fatigued. In the numberless permutations and combinations of these varied factors lies the infinite complexity of the responsive phenomena of life.

After a discussion of Professor Bose's paper by Doctors Rusby, Richards, and Pond, the meeting of the Club was adjourned to the second Tuesday in January.

MARSHALL A. HOWE,
Secretary pro tem.

OF INTEREST TO TEACHERS

FOOD FOR THOUGHT

School Science and Mathematics for January gives the following "simple plant experiment" by E. S. Gould, of Galva, Illinois.

"The following device for showing the necessity of CO_2 in photosynthesis may be of use to teachers of botany, especially where apparatus is limited.

"A bell glass with a rubber stopper is placed on an ordinary pump plate. The tube *C* of the plate is closed with a cork. In the cylinder inside is placed NaOH or $Ca(OH)_2$ to absorb the CO_2. Air is forced through tube *A* (tube *B* being open) for a few minutes until the most of the air in the bell glass is devoid of CO_2. What CO_2 is left in the glass will be absorbed by the NaOH in the cylinder. The air is changed every day so that if

there were anything in air beside CO_2 that helped in photosynthesis the plant would be sure to have it. Tube *B* is kept closed except when it seems necessary to introduce water through it to the plant. Before commencing the experiment the leaves of the plant were found to contain starch, but after continuing it three days all traces of starch disappeared, thus proving that CO_2 is necessary in photosynthesis.

"The department editor * wishes to raise four questions relative to this experiment:

1. Do the pupils know enough chemistry to enable them to prove that NaOH or $Ca(OH)_2$ takes CO_2 from the air?

2. Is it true that forcing the air through the liquid in the cylinder by means of tube *A*, and out of the bell jar through tube *B* "for a few minutes" would render "most of the air in the bell jar" devoid of CO_2?

3. How does the pupil know that in watering the plant through tube *B* you do not introduce CO_2 sufficient for the plant's uses?

4. Does this prove "that CO_2 is necessary in photosynthesis"?

"Do not all the points raised in these questions refer to things that the student must take for granted upon the authority of the teacher? If so, would it be quite as well for the pupil to assume in the beginning that the teacher is correct when he says that CO_2 is necessary to the process of photosynthesis?"

The Outlook of December 19 has a short, practical article on forest fires and their prevention, written by Alfred L. Donaldson.

The increasing interest taken in our national forests is indicated by Speaker Cannon's statement that three years ago they cost three hundred and seventy-five thousand dollars, this year, nearly four million, and the estimates for next year are about six million dollars.

The North American Review for November, 1908, contains an article by Gifford Pinchot on "The Foundations of Prosperity" which is well worth reading. Mr. Pinchot remarks that the

* Professor O. W. Caldwell, School of Education, University of Chicago. It is with his permission that this article is reprinted from *School Science and Mathematics*. — Editor's Note.

"Forest Service is the sole present example of a branch of our National Government which finds the reason for its existence in the need of a long look ahead"; and he rightly emphasizes the present discussion of the conservation of natural resources as "the most fundamental question now before the country." For "if we succeed in the conservation of our natural resources, we shall have an opportunity to succeed in everything else."

Science has recently printed another article on the coconut bacterial disease known as bud-rot, which is becoming very common in tropical America. "It is confined to the crown, or terminal bud, of the tree, in which it causes a soft, vile-smelling rot. Owing to the great height of the coconut trees and the difficulty experienced in getting at the terminal bud, surrounded as it is by the sheathing cases of the petioles of the leaves, it is almost impossible to treat the disease locally." The results of the investigations carried on by the United States Department of Agriculture and by appropriations in Cuba are expected to prove helpful. At present the disease seems to be increasing rapidly and none but very early cases are checked by treatment.

Professor Edward L. Nichols, retiring president of the Amerian Association for the Advancement of Science, in his Baltimore address on "Science and the Practical Problems of the Future", said, "Forests may be renewed and the soil restored to its maximum fertility but the problem which is presently to confront the race is that of civilized existence without recourse to energy stored by the slow processes of nature. This problem must be definitely solved before the complete exhaustion of our inherited capital. The problem is not without conceivable solution, since the annual accession of energy from the sun, did we know how to utilize it without awaiting the slow processes of storage employed by nature, is ample for every thinkable need of the future inhabitants of our planet. Estimates of the constant of solar radiation show that about 2.18 kilowatts of power is continually received from the sun for every square meter of the earth's surface or over seven and a half millions of horse-power per square mile. The

present use of power in the United States is about eighty million horse-power or one horse-power per capita. This quantity is likely to increase more rapidly than the population in the future unless curtailed by lack of fuel, but it is evident that a very small fraction of the sun's radiation would meet all demands."

NEWS ITEMS

Mr. E. H. Eaton has been made professor of biology at Hobart College.

Mr. A. J. Grout has been transferred to the Curtis High School, New Brighton, Staten Island.

Dr. J. K. Small has recently been sent to Florida by the New York Botanical Garden for a month's collecting trip.

In December, 1908, New York State, at a cost of about $600,000, added 15,000 acres to its forest reservations in the Adirondack and Catskill regions.

Mr. Raphael Zon is studying forest management in Europe, preparatory to taking charge of the experimental work of the United States Forest Service.

The Sullivant Moss Society met at Baltimore with the American Association for the Advancement of Science. Several interesting papers were presented.

Mr. C. A. McLendon, of the South Carolina Experiment Station, has accepted the position of botanist and plant pathologist at the Georgia Experiment Station.

On January 11 the United States Senate passed a bill appropriating $90,000 for acquiring all private holdings in the Sequoia and General Grant national parks, California.

Collections are now being made for the New York Botanical Garden along the northern coast of Cuba by Dr. J. A. Shafer, who expects to spend three months in that region.

The State Agricultural College at New Brunswick, New Jersey, offers several short winter courses in general agriculture, fruit farming, market gardening, etc. Tuition is free to residents of the state.

An address by Professor N. L. Britton on "Darwin's Work in Botany" will form part of the Darwin exercises which are to be held at the American Museum of Natural History by the New York Academy of Sciences on February 12.

Dr. James Fletcher, botanist and entomologist, died last November in Montreal. He had served as botanist at the Dominion Experimental Farms, and Dr. L. O. Howard has termed him "the heart and soul of the Botanical Club of Canada."

Earl Grey, Governor-General of Canada, and President Diaz, of Mexico, have been asked by President Roosevelt to send representatives to a national conference on the conservation of natural resources, which will be held in Washington, February 18, 1909.

A prize of $1000 is offered by the Naples Table Association for promoting laboratory research by women. The prize is awarded in April, 1909, for the third time; it is given for the best thesis, written by a woman, on a scientific subject and must be based on independent research in biological, chemical, or physical science. Further information will be given by Mrs. A. D. Mead, 283 Wayland Avenue, Providence, R. I.

The Baltimore meetings of Section G of the American Association for the Advancement of Science alternated with those of the Botanical Society of America. The vice-presidential address of Professor Bessey was given Tuesday afternoon. An unusually large number of papers — over sixty — was presented, and it was necessary to run two parallel subsections of the section: one for pathology and one for morphology, physiology, ecology, and taxonomy. The officers for next year are: Professor D. P. Penhallow, of McGill University, vice-president, and H. C. Cowles, secretary.

The Botanical Society of America together with the Society for Plant Morphology and Physiology and the American Mycological Society held several sessions in the Eastern High School building. President W. F. Ganong presided. Papers by E. C. Jeffrey and J. M. Coulter on vascular anatomy and its recent development opened the first scientific program. The symposium on ecology included the following papers:

"The Trend of Ecological Philosophy", H. C. Cowles; "The Present Problems of Physiological Plant Ecology", B. E. Livingstone; "Vegetation and Altitude", C. H. Shaw; "Local Distribution of Desert Plants", V. M. Spalding; and "The Relation of the Climatic Factors to Vegetation", E. N. Transeau.

A special Darwin Memorial Session was held on Thursday afternoon. The program was as follows:

"General Sketch and Estimate of Darwin's Work on Cross-pollination in Plants", William Trelease; "Estimate of Darwin's Work on Movement in Plants", H. M. Richards; "Darwin's Influence on Plant Ecology and Plant Geography", F. E. Clements.

Many other interesting papers were presented at the regular sessions. Dr. J. C. Bose, by invitation, gave his address on "Electrical Response in Plants." The address of the retiring president, Professor G. F. Atkinson, was given at McCoy Hall, Tuesday evening. The botanists' dinner, held on Wednesday evening, was attended by about one hundred and twenty people. The officers for the new year are as follows: President, Roland Thaxter; secretary, Duncan S. Johnson; and treasurer, Arthur Hollick.

An editorial in *Science* for January 8 says in discussing the Baltimore meeting of the American Association for the Advancement of Science, "It seems to be scarcely credible, but it is the case, that there were on the program published by the association the titles of more than one thousand papers to be read at the meeting. The great majority of the papers represent research work of a high order. It is sometimes said that the United States is not doing its part in the advancement of science, but this program is a conclusive answer to such criticism. No other country except Germany could hold a meeting in which so many scientific researches maintaining such high standards could be presented as the result of a year's work, and Germany has never held such a meeting."

The Darwin centenary memorial exercises were held January 1, at McCoy Hall, Johns Hopkins University, Baltimore, as previously announced. Beginning at 10 A. M., the entire day was devoted to the commemoration of the 100th anniversary of the birth of Charles Darwin and of the fiftieth anniversary of the publication of the first edition of the "Origin of Species". The exercises were held under

the joint auspices of the American Association for the Advancement of Science and the American Society of Naturalists. All the addresses are to be printed in a memorial volume to be published by Henry Holt and Co., of New York. The program for the whole day included:

1. Introductory Remarks, Prof. Thomas C. Chamberlin, University of Chicago, President of the Association.

2. "Fifty Years of Darwinism: Past and Future Experimental Work Bearing on Natural Selection", Dr. Edward B. Poulton, Hope Professor of Zoölogy, Oxford University.

3. "The Theory of Natural Selection from the Standpoint of Botany", Dr. John M. Coulter, University of Chicago.

4. "Determinate Variation", Dr. Charles O. Whitman,* University of Chicago.

5. "The Isolation Factor", Dr. David Starr Jordan,* Stanford University.

6. "The Cell in Relation to Heredity and Evolution", Dr. E. B. Wilson, Columbia University.

7. "The Direct Effect of Environment", Dr. Daniel T. MacDougal, the Carnegie Institution of Washington.

8. "The Behavior of Unit Characters in Heredity", Dr. S. W. E. Castle, Harvard University.

9. "Mutation", Dr. Charles B. Davenport, Carnegie Institution of Washington.

10. "Adaptation", Dr. Carl H. Eigenmann, Indiana University.

11. "Recent Paleontological Evidence of Evolution", Prof. Henry Fairfield Osborn, Columbia University.

12. "Evolution and Psychology", Dr. G. Stanley Hall,* Clark University.

The subscription dinner given in the evening was attended by about three hundred people. Appropriate addresses followed the dinner.

* Not read.

TORREYA

February, 1909

Vol. 9 No. 2.

NORTH AMERICAN ROSE RUSTS*

By J. C. Arthur

From the days of Schweinitz, that is, the times of the first studies of American fungi, down to the near present, all rusts upon roses in North America had been placed under two species, *i. e.*, *Phragmidium speciosum*, a strictly American form, and *P. subcorticium*, a cosmopolitan form. The latter name has many synonyms, *P. mucronatum* having been especially popular, but the earliest and consequently the rightful name appears to be *P. disciflorum*, and therefore will be used in this paper.

In 1876 Peck vaguely called attention in his twenty-eighth Report of the Botanist of the New York State Musuem (page 86) to a variation in teliospores that he had observed. His words are " American specimens generally have the spores more opaque, and with two or three more septa than the typical form. This variant form might be called var. *Americanum*." The variety was placed under *P. mucronatum*. Two years ago Dietel published an extended taxonomic study of the genus *Phragmidium* in Hedwigia, and five months later a supplementary article in the same journal (**44**: 112–132, 330–346). In these two articles Dietel established and well defined four new species of *Phragmidium* inhabiting American roses, and one new species of *Caeoma*, *C. Rosae-gymnocarpae*, from California. This comprises all important taxonomic work upon rose rusts of America up to the present time.

In pursuing the study of American rusts for systematic presentation in the forthcoming North American Flora the genus *Phragmidium* has been reached, and I desire to give in this

* Read before the Botanists of the Central States, at the Madison meeting, March 29, 1907. Illustrated with the aid of the McManes fund.

[No. 1, Vol. 9, of Torreya, comprising pages 1–20, was issued January 26, 1909.]

paper some of the more interesting results that have come to light pertaining to the forms on roses.

Very little has been learned about the Californian *Caeoma.* It s clearly an aecial stage of the type of *Caeoma nitens* on *Rubus*, and like it may belong to the genus *Gymnoconia.* But as no hint has yet been secured regarding the telial stage, the assignment to any other than a form-genus is hazardous.

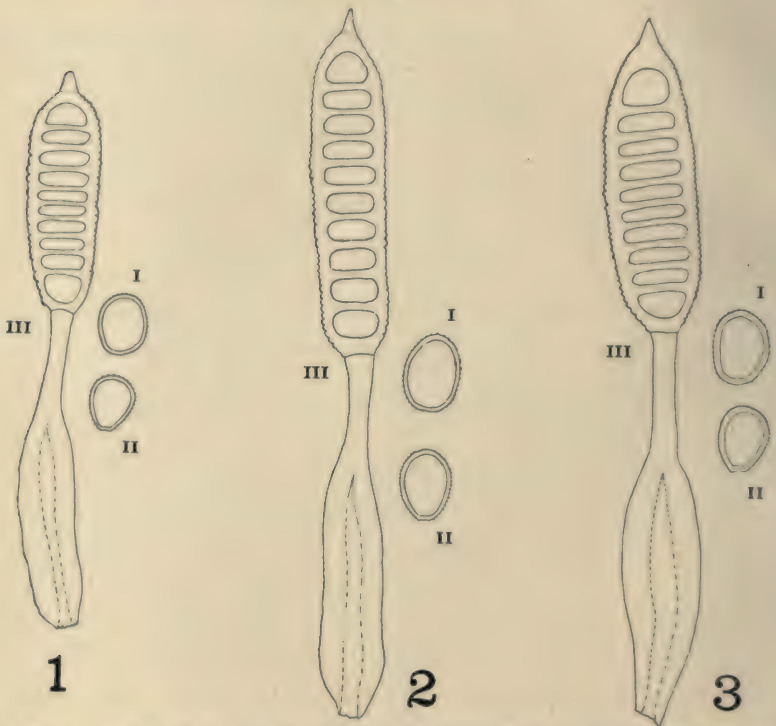

FIG. 1. Spores of the three species of *Phragmidium* on rose having slender eliospores : 1, *P. americanum*, 2, *P. Rosae-setigerae*, 3, *P. Rosae-californicae* ; I, aeciospore, II, urediniospore, III, teliospore.

The characters of the rust which has been called *Phragmidium speciosum*, such as the non-gelatinous pedicels of the teliospores, the large, compact telia, found on the stems, and the absence of a uredinial stage, show that it does not accord with true members of the genus *Phragmidium*, and justify its separation

under the name *Earlea speciosa*, made some two years ago. This rust occurs upon any and all species of roses in North America, both wild and cultivated, and extends throughout the United States and southern Canada. Its omnivorous and adaptable habits are in marked contrast with the fastidious and restricted habits of all true species of *Phragmidium* on roses found in the same region.

In carefully going over the available material of American rose rusts, properly assignable to the genus *Phragmidium*, the old world species, *P. disciflorum* and all the species erected by Dietel

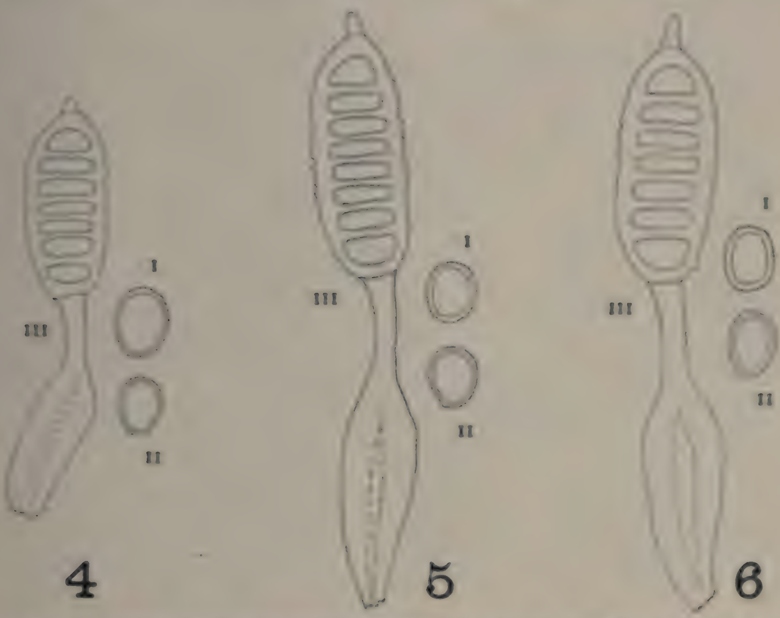

FIG. 2. Spores of the three species of *Phragmidium* on rose having stout teliospores: 4, *P. Rosae-arkansanae*, 5, *P. montivagum*, 6, *P. disciflorum*; I, aeciospore, II, urediniospore, III, teliospore.

are confirmed, as common in North America, together with one additional species now to be described. In defining these species, characters have been drawn from all three stages of the rust, aecial, uredinial, and telial. The new species may be characterized as follows :

Phragmidium montivagum Arthur, n. sp.*

Pycnia amphigenous, gregarious and often confluent, in small groups surrounded by aecia or on spots opposite the aecia, inconspicuous, subcuticular, 80–112 μ in diameter by 30–35 μ high.

Aecia hypophyllous and petiolicolous, 0.4–1.5 mm. across, solitary, or in irregular groups, often confluent over areas 5–10 mm. long, applanate; paraphyses abundant, conspicuous, surrounding each individual sorus, noticeably taller than the spore-mass, spatulate-capitate or clavate, 12–25 μ by 50–70 μ, wall evenly thin, 1–1.5 μ; aeciospores globoid or broadly ellipsoid, 16–19 μ by 21–26 μ, wall medium thin, 1.5–2 μ, rather sparsely but distinctly verrucose.

Uredinia hypophyllous, numerous, scattered, round, small, about 0.1 mm. or less across, soon naked, inconspicuous; paraphyses numerous and noticeable, encircling the sorus, cylindrical or slightly clavate, 9–11 μ by 45–64 μ, wall thin, about 1 μ, slightly thicker above on outer side of curve; urediniospores obovate-globoid, 16–19 μ by 19–23 μ, wall pale yellow, rather thin, 1–1.5 μ, closely verrucose-echinulate.

Telia hypophyllous, at first arising from the uredinia, numerous, thickly scattered, 0.1–0.5 mm. across; paraphyses none; teliospores cylindrical, 24–29 μ by 64–96 μ, usually rounded below and narrowed above, cells 6–9, closely and rather moderately verrucose, apex usually with a conical subhyaline papilla 7–10 μ long; pedicel rugose when dry, upper half 7–9 μ in diameter, lower part swelling in water to 15–30 μ at broadest part.

On *Rosa Sayi* Schw., Cummins, Albany Co., Wyo., July 26, 1895, *Aven Nelson 1499* (type), Crow Creek, Albany Co., Wyo., August 12, 1903, *Aven Nelson 8913*, Belt Mountains, Mont.,

* Pycniis amphigenis, in greges dispositis, inconspicuis, 80–112 μ diam., 30–35 μ altis.

Aeciis hypophyllis vel petiolicolis, 0.4–1.5 mm. latis, saepe confluentibus, applanatis; paraphysibus conspicuis, marginalibus; aeciosporis subglobosis vel ellipsoideis, 16–19 × 21–25 μ; episporio subhyalino, 1.5–2 μ crasso, verruculoso.

Urediniis hypophyllis, numerosis, minutis, rotundatis; paraphysibus cylindraceis vel clavatis, marginalibus; urediniosporis obovato-globosis, 16–19 × 19–23 μ; episporio dilute flavo, 1–1.5 μ crasso, verrucoso-echinulato.

Teliis hypophyllis, numerosis, sparsis; teliosporis cylindraceis, 24–29 × 64–96 μ, verrucosis, 5–8-septatis, loculo terminali apiculo conoideo hyalino 7–10 μ longo ornato; pedicello supra 7–9 μ diam., infra incrassato, oblanceolato vel ellipsoideo, 15–30 μ late.

In foliis *Rosa Sayi*, Cummins, Wyoming, Julo 26, 1895, *Aven Nelson, 1499*.

September, 1889, *F. W. Anderson*; and also on related species of hosts from Colorado and Utah northward in the Rocky Mountains.

Of the rose rusts in North America belonging to the restricted genus *Phragmidium* there are now to be recognized six valid species, all indigenous but one. Space does not permit, and the needs of this discussion do not require the full characterization to be given for each species, but the following key, when taken in connection with hosts and geographical data, will provide some aid to those persons who desire to determine their collections.

Teleutospores slender, 8–11-celled.
- Walls of aecio- and urediniospores thin, 1–1.5 µ.
  - Teliospores long, 80–100 µ. — 1. *P. americanum* Diet.
  - Teliospores very long, 90–130 µ. — 2. *P. Rosae-setigerae* Diet.
- Walls of aecio- and urediniospores thick, 2–3 µ.
  - Teliospores long, 90–112 µ. — 3. *P. Rosae-californicae* Diet.

Teliospores stout, 5–9-celled.
- Walls of aecio- and urediniospores medium, 1.5–2 µ.
  - Teliospores 5–8-celled. — 4. *P. Rosae-arkansanae* Diet.
  - Teliospores 6–9-celled. — 5. *P. montivagum* Arth.
- Walls of aecio- and urediniospores thick, 2–3 µ.
  - Teliospores 5–7-celled. — 6. *P. disciflorum* (Tode) James

These six species of *Phragmidium* have a most interesting distribution, both as to hosts and territory. The one species coming from Europe occurs chiefly upon thick-leaved roses of the dog and cabbage rose sections, *Rosa canina* and *R. Gallica*, their allies and hybrids, and appears to follow wherever these roses are cultivated. It is known throughout the United States from the Atlantic to the Pacific, northward into Canada, and southward into Mexico and Central America. It does not appear to have passed over to any native rose.

The distribution of the five indigenous species is shown by the accompanying chart. *P. americanum* inhabits the northeastern region along the Atlantic coast from Maryland northward and north of the great lakes, chiefly on *Rosa blanda*, *R. lucida*, *R. Sayi*, and certain cultivated varieties derived from these. *P. Rosae-setigerae* is only known upon *Rosa setigera* and *R. carolina*, extending nearly throughout the region of the hosts from central New York to central Nebraska. *P. Rosae-arkansanae* is only known

on the prairie rose, formerly called *Rosa arkansana*, now known as *R. pratincola*, and extends from northern Illinois to Kansas and northward. *P. montivagum* is found in the Rocky Mountains from southern Colorado and Salt Lake in Utah northward. It occurs on all or nearly all the many species of native roses of this region, having been reported on *Rosa Bakeri*, *R. Fendleri*, *R.*

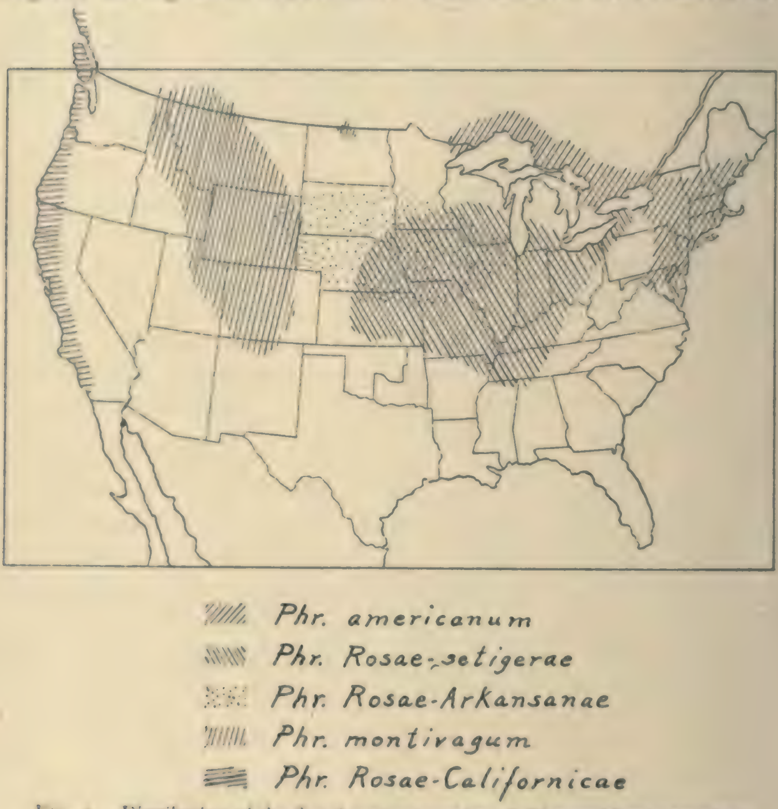

FIG. 3. Distribution of the five American species of *Phragmidium* occurring on native roses.

grosse-serrata, *R. manca*, *R. Maximiliani*, *R. Sayi*, *R. Underwoodii*, *R. Woodsii*, and others. *P. Rosae-californicae* extends along the Pacific coast from southern California to southwestern Alaska, on *Rosa californica*, *R. gymnocarpa*, *R. pisocarpa*, and *R. acicularis* chiefly.

It will be observed that there are large areas from which no

native rose rusts are reported, notably all the southern region, and the plateau between the Sierra and Rocky Mountains. Probably this is in part due to the sparseness of native hosts in these areas, to the oversight of collectors, or it may be to the absence or rarity of the rusts because of unfavorable conditions. At present it is only possible to call the attention of observers to this hiatus in our knowledge.

The especially prominent feature brought out in the study of the native rose rusts is the remarkable parallelism between them and their hosts in regard to geographical distribution and specific variability. Each species of rust inhabits one species of host or a group of species of similar physical characteristics, and ranges over quite definite areas, usually nearly coextensive with the range of the respective hosts. Probably the most variable species of all is *P. montivagum* of the Rocky Mountains, and it is also true that the roses on which it occurs form the most intricate complex of ill-defined species known to North America. Furthermore, intergrading forms are not infrequent between the mountain species, *P. montivagum*, and the prairie species, *P. Rosae-arkansanae*, along the foothills of Colorado and Wyoming, just as intergrading forms of the hosts also occur along this tension line.

In explanation of these facts probably many of the ecological factors controling the distribution of the hosts on which the rusts occur would also have a bearing on the distribution of the rusts themselves. It is not possible, however, to resist the impression that one of the chief factors is the intimate relation between host and parasite. Whatever the nature of this relationship may be, and it would be difficult to define it, it permits of a certain thriftiness of the parasite in proportion to the susceptibility of the host. Any tendencies to variability in the parasite must therefore be accentuated by changes in the host. That the variability in the parasite does not originate through any qualities in the host probably needs no proof, but has an admirable illustration in this connection. *Earlea speciosa* is found abundantly throughout all the territory and upon all the hosts inhabited by the five species of *Phragmidium*, and yet shows no marked variations, whether

comparison is instituted between specimens from widely separated regions, or from strongly dissimilar hosts. This species of *Earlea* possesses an aecium exactly comparable in appearance and habit of growth with that of the species of *Phragmidium* under discussion; and in other ways a near relationship is evident.

The fixity of characters in *Earlea* and the high variability in *Phragmidium* as shown in American rose rusts present an interesting contrast. Regarding the latter it may be safely asserted that each species of *Phragmidium* has attained a degree of orthogenetic development and a diversity of characters corresponding to those of the hosts on which it occurs, always, however, with a certain lag due to the inhibiting nature of parasitism.

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THE PERENNATION OF THE CLOVER DODDER, CUSCUTA EPITHYMUM MURR *

BY F. C. STEWART AND G. T. FRENCH

In almost all botanical writings the numerous species of *Cuscuta* are all classed as annuals. It appears to be the prevailing opinion that none of the dodders survive the winter in the thread form and that, in order to perpetuate themselves, they must start anew every year from seeds. Yet, so long ago as 1868 Dr. Julius Kühn made the announcement,† based on his own observations, that clover dodder, *Cuscuta Trifolii* (= *C. Epithymum*), lives over winter on clover and alfalfa plants in Germany. Also, Sorauer, in the second edition of his well-known Handbuch der Pflanzenkrankheiten, published in 1886, states that clover dodder is not annual but perennial, and that on perennial plants it perpetuates itself more often by the further growth of the previous year's dodder plants than by the germination of new seeds. On the other hand, Frank,‡ ten years later, makes an equally positive statement that the dodders are all annual plants that start anew every year from seed. In 1900 Kühn

* Read before Section G of the American Association for the Advancement of Science, Baltimore Meeting, December 31, 1908.

† Ztschr. landw. Centralvereins der Provinz Sachsen 25 : 238.

‡ Die Krankheiten der Pflanzen, Zweite Aufl. 2 : 523.

published a second paper * on the subject, in which he characterizes the supposed annual habit of clover dodder as one of those errors which, even in the realm of science, are sometimes held to with remarkable tenacity. After citing his observations made in 1868, he states that he has since confirmed them in various years, even in those having the hardest winters.

With the exception of two recent articles † by the writers of this paper, there seems to be no published record of any dodder living over winter in the United States. Yet, our observations indicate that *Cuscuta Epithymum* is frequently perennial here.‡ During the past three years this species has lived over winter in New York alfalfa fields, hibernating on the crowns of alfalfa, red clover, and certain weeds. This is not accidental or occasional, but of common occurrence. In the writers' opinion, it is the chief method by which dodder is carried over from one year to the next in New York alfalfa fields. In dodder-infested fields live dodder may be found readily during the winter and spring at any time when the ground is free from snow. One should take a sharp, heavy hoe or light grub-hoe and cut off and examine the crowns of plants standing on the margin of a dodder spot of the previous season. For the most part, the hibernating dodder threads appear in the form of tufts of short, stout yellow threads, one fourth to one half inch long, attached to the bases of the branches close down to the ground around the crown of the host plant and especially on the under sides of branches lying close to the ground. Yellow, haustoria-bearing threads tightly coiled around the very lowest parts of the stem are also common, but in no case have we observed dodder on the root proper.

Besides alfalfa and red clover, the favorite winter hosts of dodder are fleabane (*Erigeron annuus*) and yellow trefoil (*Medicago lupulina*). We have seen it also on dandelion. Although

* Ber. Physiol. Lab. u. Vers. Anst. Landw. Inst. Halle. 1900. Heft 14, 144-155.

† (1) Stewart, F. C. Further studies on alfalfa dodder and trefoil. N. Y. State Dept. Agr. Report of Director of Farmers' Institutes and Normal Institutes for the year 1906, 67, 1907. (2) Stewart, F. C. et. al. Troubles of alfalfa in New York. N. Y. Exp. Sta. Bull. 305. Nov., 1908.

‡ Full details of these observations are given in N. Y. Exp. Sta. Bul. 305: 369–374.

Erigeron annuus and *Medicago lupulina* are generally classed as annuals, they are regularly biennial in New York alfalfa fields.

While the appearance of the hibernating dodder is such that there seems little reason to doubt that it really is alive and capable of further growth, the writers have thought it best to place the matter beyond question by forcing the threads into growth. This has been accomplished several times by placing the dodder-infested crowns in a moist chamber for a few days. Given warmth and moisture the dodder threads begin to lengthen promptly. In six such experiments the dodder-infested crowns were placed in contact with thrifty young alfalfa plants growing in pots in a moist inoculation chamber in a greenhouse. In every case the dodder started promptly, established itself on the alfalfa plants and there made a vigorous growth.

Our observations have been confined to the State of New York; but dodder hibernates there so frequently and under such a variety of conditions as regards soil and exposure, that we can but believe that it is perennial also in other parts of the United States.

Whether other species besides *Cuscuta Epithymum* are perennial, we cannot now say. In every instance in which the identification of the dodder has been made possible by the appearance of flowers, the species has been found to be *C. Epithymum*.

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NOTES ON SAGITTARIA

By Kenneth K. Mackenzie

Almost all American botanists are acquainted with the common arrow-head (*Sagittaria latifolia* Willd.), and are familiar with the great amount of variation in the shape of its leaves. These are ordinarily strongly sagittate, but they vary from several inches broad to but two or three millimeters. All botanists are, however, thoroughly agreed that these variations, while striking, are of no importance from a systematic standpoint, but depend entirely on the conditions under which the plant has grown. This, then, being the thoroughly understood condition with reference

to the above species, one necessarily approaches the study of related species with similar thoughts in mind.

Two plants closely related to the common arrow-head were separated in 1894 by Mr. Jared G. Smith in his revision of the North American species of the genus. All the standard manuals since that time have recognized these two plants as valid species, and the distinctness of *Sagittaria Engelmanniana* J. G. Smith and *Sagittaria longirostra* (Micheli) J. G. Smith, as these two plants were named, has not been questioned. They are, of course, both thoroughly distinct from *Sagittaria latifolia*, but when one comes to study the distinctions relied on between the two plants themselves, he soon finds out that the distinctions emphasized are the very ones which are universally agreed to be of no value in separating forms of *Sagittaria latifolia*.

Thus Mr. Smith's own key is as follows:

"Fertile pedicels much shorter than the bracts; leaves ample; beak of the achenium stout, erect .... *S. longirostra*

"Fertile pedicels longer than the bracts; leaves with linear lobes; beak of the achenium erect .... *S. Engelmanniana*"

Practically the same key is used in the Illustrated Flora except that the achenium characters are omitted, and properly so, because in Mr. Smith's detailed description he says that *S. Engelmanniana* has a stout beak, thus leaving no marks of difference in this respect.

In the recently issued "Gray's Manual" the key used is

"Stout; leaf-blades broadly ovate-oblong .... *S. longirostra*

"Slender; leaf-blades linear .... *S. Engelmanniana*"

So much then for the history of the plants, and now for an experience of my own with them. Although I had collected the plants before this year, the collections never had been under the most favorable conditions, but this year conditions seemed to be just right, when on Labor Day I went to Forked River in the New Jersey pine-barrens. Immediately beyond the station there, there is an artificial pond, the shores and shallower portions of which I quickly found were lined with *Sagittaria*. It was in fine fruiting condition and many specimens agreed well with *S. Engelmanniana* as described in the manuals, but others had

broader leaves. Continuing my journey around the pond I found back in the bushes at the margins other specimens with the broad leaves and stouter appearance of *S. longirostra*, but I also found all manner of intergradation between the two, just as one would find with *S. latifolia.* In fact as many forms could have been found as there have been of the common plant. As to the comparative length of bracts and pedicels all I can say is that these organs varied with individual plants just as in *S. latifolia*, and differences in their comparative length are of no value in separating the plants under discussion.

My conclusion then is that *S. longirostra* and *S. Engelmanniana* as described in the manuals are but forms of the same species. Whether *S. Engelmanniana* is technically based on specimens really representing a species distinct from *S. longirostra*, is a question which Dr. Small is now investigating for the North American Flora. At all events, however, the characters heretofore relied on to separate these plants are plainly insufficient.

NOTES ON RUTACEAE — II

Xanthoxylum cubense P. Wilson, comb. nov.

Zanthoxylum juglandifolium Rich. Ess. Fl. Cub. 332. 1845. Not Willd. 1806.

Fagara juglandifolia Krug & Urban, Bot. Jahrb. **21** : 587. 1896.

Type locality : In high mountains of Vuelta de Abajo and around Guanimar, Cuba.

Distribution : Cuba.

Xanthoxylum jamaicense P. Wilson, sp. nov.

A glabrous tree 5–10 m. tall with a spiny trunk ; branches unarmed or armed with few, solitary, slender, brownish prickles, 3–6 mm. long ; leaves odd-pinnate, 13–24 cm. long ; leaflets 3–9, oblong to oval or somewhat obovate, 2.8–11 cm. long, 1.5–4.8 cm. broad, short-petioluled or subsessile, more or less crenate, short and obtusely acuminate or rarely rounded at the apex, cuneate and equilateral or inequilateral at the base, dull or somewhat lustrous above, paler and the venation more prominent beneath ; inflorescence terminal, paniculate-corymbose ; staminate

flowers (immature): sepals 3, semioval to broadly triangular; petals 3, ovate; stamens 3; pistillate flowers: sepals 3, broadly triangular; petals 3, ovate, 2–2.2 mm. long, 1–1.2 mm. broad; ovary 3-carpellary, sessile; follicles (immature) subglobose, 4 mm. in diameter, brown, apiculate, the surface pitted.

Type collected at Dolphin Head, Jamaica, N. L. Britton no. 7318; also collected in hills near Kempshot, N. L. Britton no. 2433.

Distribution: Jamaica.

TRIPHASIA Lour. Fl. Cochinch. **1**: 152. 1790.

Triphasia trifolia (Burm. f.) P. Wilson, comb. nov.

Limonia trifolia Burm. f. Fl. Ind. 103. 1768.

Limonia trifoliata L. Mant. 237. 1771.

Triphasia Aurantiola Lour. Fl. Cochinch. **1**: 153. 1790.

Triphasia trifoliata DC. Prodr. **1**: 536. 1824.

Note: The illustration of the flower in Burm. f. Fl. Ind. (pl. 35) is incorrectly figured with five petals.

Type locality: Java.

Cultivated and naturalized in tropical and subtropical America as far north as Florida and Texas.

PERCY WILSON.

THE FIELD MEETINGS OF THE CLUB FOR 1909

In order that the field meetings of the club may be attractive to the members, and also accomplish work of permanent value, it is proposed to arrange a definite plan of campaign for the entire season of 1909.

This will be done in coöperation with the chairman of the local flora committee, so that the local herbarium may be increased where it is weakest, and sufficient material may be accumulated to serve as a basis for a descriptive list of the plants growing within the area prescribed by the preliminary catalog of the club in 1888. The specimens in the club herbarium, together with the collections of the New York Botanical Garden are being critically studied and tabulated, so that when the season opens everything will be in readiness for an effective system of

field meetings. These will have in view partly the enlargement of the collections, and partly the equally desirable end of providing attractive and interesting excursions for members interested in our metropolitan flora.

Various features of interest will be planned from time to time such as (*a*) changes from month to month in the floristic aspect of restricted ecological areas, (*b*) the encroachment of plants beyond their supposed natural habitats, (*c*) the behavior of aquatic and land plants when subjected to unusual conditions, (*d*) introduced plants and their ability to spread and maintain themselves, (*e*) the pine-barrens of Long Island and New Jersey and their relation and similarity, and (*f*) so-called "weeds" and ballast plants and their occurrence and adaptability. These are only a very few of the problems that offer delightful possibilities to those willing to take the time and trouble of collecting and making careful notes. In Torreya for July 1908, Dr. R. M. Harper has outlined scores of such problems, but many of them are unfortunately beyond the scope of the field meetings of the club. Care will be taken to distribute the excursions so that those interested particularly in the cryptogamic flora will not suffer injustice because of a preponderance of meetings planned for the higher flowering plants, and vice versa.

There are about thirty-one days upon which it is possible to hold field meetings, and it is necessary in order to systematize them to make plans early in the season. To do this will require the hearty coöperation of members able and willing to act as guides. The chairman of the field committee will attend all the meetings possible, but it is essential to the success of the meetings that an efficient corps of guides volunteer for the work. Everything that can be done towards the arrangement of time and place of meeting will be carefully planned. Those willing to act as guides will greatly further the work if they will send their names, together with the dates upon which they will serve and the districts with which they are familiar, to the undersigned.

NORMAN TAYLOR,
Chairman Field Committee

NEW YORK BOTANICAL GARDEN.

REVIEWS

Recent Bulletins of the State Geological and Natural History Survey of Connecticut*

The State Geological and Natural History Survey of Connecticut published in 1905 "A preliminary report on the Hymeniales of Connecticut," by Edward Albert White, and "The Ustilagineae or smuts of Connecticut," by George Perkins Clinton. In the latter part of 1908 there appeared notable continuations of the published results of the botanical survey of that state in "A preliminary report on the algae of the fresh waters of Connecticut" by Herbert William Conn and Lucia Washburn (Hazen) Webster, and "The bryophytes of Connecticut" by Alexander William Evans and George Elwood Nichols. The report on the fresh-water algae consists essentially of brief synopses of the classes and orders, keys to the genera and short descriptions of them, the names of the species found, and, with few exceptions, figures of all the species collected by the writers within the limits of the state. A few species are admitted on the authority of Hazen and of Setchell, and the names of a considerable number from the "Phycological notes of Isaac Holden," published by F. S. Collins in Rhodora, have been introduced in brackets. The Cyanophyceae and Characeae are included, but no attempt is made to treat the Diatomaceae. The treatment of the Characeae is, however, very inadequate, only one species and that an unnamed one being figured. The authors have evidently not made use of the monographs of T. F. Allen and of C. B. Robinson, in which Connecticut materials are mentioned. The authors appear to have devoted their attention largely to the Conjugatae. Under *Spirogyra*, *Zygnema*, *Closterium*, *Cosmarium*, *Staurastrum*, and *Micrasterias*, numerous species are listed and figured, but under genera like *Cladophora*, *Oedogonium*, and *Vaucheria*, which may reasonably be supposed to be well represented in Connecticut, the lists are confined to two or three species each. For the

*Conn, H. W., & Webster, L. W. A preliminary report on the algae of the fresh waters of Connecticut. State Geol. and Nat. Hist. Surv. Conn. Bull. 10: 1–78. *pl. 1–44.* 1908.

Evans, A. W., & Nichols, G. E. The bryophytes of Connecticut. State Geol. and Nat. Hist. Surv. Conn. Bull. 11: 1–203. 1908.

species, no descriptions or keys are given, and specific determinations, if they are to be made from the report at all, must be made from the figures. The keys, it is to be regretted, are often inadequate and sometimes positively misleading, as when under *Chara* it is asserted that "The stems are covered with a cortex," a statement that would result in excluding *Chara Schweinitzii* (*C. coronata* of most American authors), one of our commonest species. Many of the figures, especially, perhaps, those of the desmids, give a fair idea of the general habit and form of the organisms treated, but some of the others, like that of *Gloeotrichia Pisum*, can scarcely be of service to the student, in the determination of the species, at least.

The bulletin on "The bryophytes of Connecticut" by Professor Evans and Mr. Nichols is a thoroughly scholarly and scientific paper and one that is likely to have much good influence in stimulating and aiding the study of the bryophytes in Connecticut and neighboring states. The catalogue of species is prefaced by a general introduction of thirty-seven pages, in which are discussed "General characteristics of the bryophytes", "History of bryology in Connecticut", "Distribution of the bryophytes in Connecticut according to environment", and "Economic value of the bryophytes". Under the head of distribution according to environment, the factors considered are latitude, character of substratum, intensity of light, and water supply. In the body of the catalogue are keys to the families, genera, and species, lists of the known Connecticut species, names of collectors, references to exsiccatae and to the principal literature, and statements as to the extra-limital distribution of the species. The general summary shows that 387 species of bryophytes are at present known to occur in Connecticut and that of these 12 belong to the Marchantiales, 92 to the Jungermanniales, 3 to the Anthocerotales, 31 to the Sphagnales, 2 to the Andreaeales, and 247 to the Bryales. Only about 18 per cent. of the species are peculiar to America. Over 62 per cent. are common to Europe and Asia, while, of the remainder, 16 per cent. have been found in Europe but not in Asia and 4 per cent. have been found in Asia but not in Europe. Misprints in this paper are few, but

on page 101 *Dicranum falcatum* is listed where *D. montanum* was evidently intended, as is apparent from the key. It is to be hoped that members of the Torrey Botanical Club will in the near future devote themselves to the study of the flora of the metropolitan district with the purpose of publishing a series of papers similar to "The bryophytes of Connecticut" in order to facilitate the study and ready identification of both the seed-bearing and seedless plants of the vicinity of New York City. Meanwhile, "The bryophytes of Connecticut" will prove almost as useful in New York and indeed along our whole North Atlantic seaboard as it will in Connecticut.

Marshall A. Howe.

PROCEEDINGS OF THE CLUB *

January 12, 1909

The first meeting of the Club for 1909 was held at the American Museum of Natural History, with President Rusby in the chair. There were ten members present.

After the reading and approval of the minutes for December 8, 1908, the resignations of the following members were presented and accepted: Miss Anna Murray Vail, Miss Henrietta E. Hooker, Mrs. John R. Delafield, Mr. C. C. Hanmer, and Mr. Albert Ruth.

This being the annual meeting of the Club, reports were presented by the treasurer, editor, chairman of the field committee, and the secretary. These were read, accepted, and placed on file.

The editor reported the completion of Volume 35 of the *Bulletin*, containing 608 pages and 40 plates. The only *Memoir* published during 1908 was "A Study of the Lactariae of the United States" by Dr. Gertrude S. Burlingham. This paper was issued in May as No. 1 of Volume 14 of the Club's Memoirs, and contained 109 pages and 15 half tone illustrations.

Mr. Charles Louis Pollard presented his report as chairman of the field committee up to the time of his resignation in August. Mr. George V. Nash, who acted as chairman for the remainder

* No meeting was held the last Wednesday in December.

of the season, presented a supplementary report. Mr. Norman Taylor was appointed by the president chairman of the field committee for 1909.

The secretary reported that 15 regular meetings had been held during the year, at which 463 persons were present. Nine persons have been elected to membership but not all have qualified, and 14 resignations have been received and accepted. Through death the Club has lost three members.

The treasurer's report indicated that the Club's finances are in a satisfactory condition.

The following officers were elected for the year 1909:

President: Henry Hurd Rusby.

Vice-Presidents: Edward Sandford Burgess and John Hendley Barnhart.

Secretary: Percy Wilson.

Treasurer: William Mansfield.

Editor: Marshall Avery Howe.

Associate Editors: John Hendley Barnhart, Jean Broadhurst, Philip Dowell, Alexander W. Evans, Tracy Elliot Hazen, William Alphonso Murrill, Charles Louis Pollard, and Herbert Maule Richards.

The Club adjourned at 10:15 P. M.

PERCY WILSON,
Secretary

OF INTEREST TO TEACHERS

LABORATORY TEACHING

Professor Charles H. Shaw, discussing laboratory teaching for culture students in *Science* for September 11, states that the average student falls to a discouraging degree short of "developing that power of obtaining knowledge which it was planned that he should," and "as a matter of fact the hours when actual independent work is being done are few and precious, and the greater part of the laboratory time is spent in merely performing assigned tasks."

Professor Shaw further adds: "In looking for a solution my

point of departure would be the fact that *certain* of the lessons actually do call out a real interested and independent effort on the part of the student. That ounce of fact is worth tons of theorizing. Then if it is true that the greatest good which can come to the student out of such courses is the development of his own powers of obtaining knowledge, it would not seem far to this principle: *The laboratory course should be composed mainly of those lessons which the instructor can so present as to arouse independent effort on the part of the student.*

"Then the question will at once arise 'What about the lessons of which this is not true; what about the many and important topics in which the student can at best scarcely do more than to perform faithfully the task assigned?' My answer would be to remove most of them frankly to the domain of lecture and demonstration. A good demonstration, where the student feels the spark of inspiration from the teacher's performance and example, is far better for both teacher and student than a time-serving laboratory exercise.

"No doubt a certain proportion of laboratory lessons which are mere verification exercises are desirable, but on the whole it still remains true that for culture students *the laboratory hours are too precious to be used in anything but independence begetting work.* In the lecture room is the place to see that the course is rounded out, kept coherent, and the ground covered."

In a recent paper, Charles J. Brand, of the U. S. Bureau of Plant Industry, traces the history of alfalfa in the United States. The earliest date of introduction is 1855, from South America to California; the next, 1857, from Europe to Minnesota.

The South American seed finding a congenial soil and climate easily became the basis of an extensive industry now netting $150,000,000 a year. The European seed, despite the favorable soil in Minnesota, was acclimated with difficulty; but Grimm, the farmer who introduced it, worked with "characteristic German persistence, realizing neither the practical nor the scientific importance of his unconscious experiment in acclimatization." He

"patiently saved generation after generation of seeds from the plants that survived each successive winter, planting new fields to replace the deteriorated ones on his own farm, and selling his surplus seed to his neighbors. He was probably oblivious both to the difficulty of the task he had undertaken and to the great value of the result, and took as a matter of course the yearly degeneration of his stands," until now the Grimm strain is recognized as one of the hardiest; it "is undoubtedly the direct product of fifty-one years of perpetuation of fit and elimination of unfit individuals under climatic conditions whose rigors are unknown in Germany."

Robert Kennedy Duncan in his recent book, "The Chemistry of Commerce," has a chapter on cellulose which is written in a manner making it equally interesting to a scientist or to a novice in the field. He shows the stupendous industrial utility of cellulose and the immense value of each fact gleaned from the field of cellulose research. At present, although one third of the dried vegetable matter of the world is cellulose, it cannot be synthesized in the laboratory and very little is known about it.

One class of cellulose industries is based on its inertness and resistivity to the disintegrating action of air and moisture. First in importance comes paper, both that made from the comparatively pure cellulose of rags and that from wood pulp. As most of the cellulose in wood exists chemically encrusted with other substances, the problem has been either to manufacture the paper directly from wood, in which case it does not last, or to devise a means of extracting the pure cellulose. This has been done but the resulting cellulose is not so pure as that from cotton. Another important cellulose industry, the making of fabrics, has almost reached perfection. One interesting phase is the mercerization of cotton by the application of caustic soda. Twine and rope are also cellulose products. Out of the 110,000 species of flowering plants that exist in the world, the fiber-making possibilities of only half a dozen are used.

Cellulose also has merit as a chemically active body. Dissolved in one substance it forms vulcanized fiber or may be carbonized for incandescent light filaments. When treated in another

way an insulating material for electric wires is formed. By still another method, viscose, a very plastic form of cellulose, can be obtained. This can be moulded into various forms or made into films possessing great elasticity. The addition of nitric acid or nitroglycerin results in gun cotton, blasting gelatin, or smokeless powder. Our common celluloid comes from low cellulose nitrates dissolved in solid camphor and alcohol. One of the greatest triumphs of technological science is the production of artificial silk from either cellulose nitrate or viscose. The value of a pine tree is increased nearly 600 fold when it is spun into this silk.

The cellulose industry is developed upon an exceedingly slender knowledge of the raw material and it would be well for manufacturers and centers of technical education to give more attention to the subject. — Jane R. Condit.

Recent government publications contain the following statements: "When water falls on the soil part of it runs off the surface, and part of it runs through the surface by gravitation and comes out in the subsoil, and part of it starts and rises as soon as we get sunlight on the surface, and this part comes up in films over and through the finer spaces, and is bringing with it dissolved material from below." The water that passes through larger openings, gets very little of the soluble material, "because it is not long in contact with the soil grains. It gets some by reason of the fact that, as we know, our springs and rivers and wells are all soil solutions and carry mineral matter. Now, water rising by capillarity cannot get very concentrated because it gets saturated with the minerals, and any excess that is contained in it is thrown out, except in extreme conditions, as in the west, and then we get alkali conditions; but under ordinary humid conditions we cannot have an excess of it, and the soil solution is bringing materials from below which the plant gets, and, as a matter of fact, the most important discovery of the Bureau of Soils in recent years is that plants are feeding on material from the subsoils, far below where the roots go. If this is true, and there are many other arguments in the same line, it is absurd to make an analysis of the surface soil and say that is the

soil that the plant is feeding on." Professor C. G. Hopkins, in a lecture given at Cornell last July, refers to the above quotation and states that because of proven "uncompensated loss by leaching of the upper soil in all normal humid sections, we dare not base our definite plans for systems of permanent agriculture upon a theory that by the rise of capillary water plant food is brought from the lower subsoils sufficient to meet the needs of large crops and to maintain the fertility of the surface soil in all places and for all time."

Professor Hopkins further says: "One dollar taken from 100 dollars leaves not 100 dollars, but only 99 dollars. This is a scientific fact which no theory or hypothesis can nullify. Likewise when a crop removes 20 pounds of phosphorus from the soil it leaves that soil 20 pounds poorer in phosphorus than before the crop was grown. The rotation of crops or the application of salt or some other stimulant may liberate another 20 pounds of phosphorus from the soil and thus enable us to grow another crop the next year, and possibly this may be repeated for several or many years, but meanwhile the total supply of phosphorus in the soil is growing smaller and smaller year by year, until ultimately neither crop rotation nor soil stimulants can liberate sufficient phosphorus from the remaining meager supply to meet the needs of profitable crops. It is certainly safe teaching and safe practice to return to the soil as much or more than we remove of such plant-food elements as are contained in the soil in limited amounts when measured by the actual requirements of large crops during one lifetime."

The following extracts from President Roosevelt's recent message to Congress are of interest:

(1) "There are, of course, two kinds of natural resources. One is the kind which can only be used as part of a process of exhaustion; this is true of mines, natural oil and gas wells, and the like. The other, and of course ultimately by far the most important, includes the resources which can be improved in the process of wise use; the soil, the rivers, and the forests come under this head."

(2) "There are small sections of our own country, in the east

and in the west, in the Adirondacks, the White Mountains, and the Appalachians, and in the Rocky Mountains, where we can already see for ourselves the damage in the shape of permanent injury to the soil and the river systems which comes from reckless deforestation. It matters not whether this deforestation is due to the actual reckless cutting of timber, to the fires that inevitably follow such reckless cutting of timber or to reckless and uncontrolled grazing, especially by the great migratory bands of sheep, the unchecked wandering of which over the country means destruction to forests and disaster to the small homemakers, the settlers of limited means."

(3) "Not many centuries ago the country of northern China was one of the most fertile and beautiful spots in the entire world and was heavily forested.

"We know this not only from the old Chinese records, but from the accounts given by the traveler Marco Polo. He, for instance, mentions that in visiting the provinces of Shansi and Shensi he observed many plantations of mulberry trees. Now there is hardly a single mulberry tree in either of these provinces, and the culture of the silkworm has moved further south, to regions of atmospheric moisture. As an illustration of the complete change in the rivers, we may take Polo's statement that a certain river, the Hun Ho, was so large and deep that merchants ascended it from the sea with heavily laden boats; to-day this river is simply a broad sandy bed, with shallow, rapid currents wandering hither and thither across it, absolutely unnavigable.

"But we do not have to depend upon written records. The dry wells, and the wells with water far below the former water mark, bear testimony to the good days of the past and the evil days of the present. Wherever the native vegetation has been allowed to remain, as, for instance, here and there around a sacred temple or imperial burying ground, there are still huge trees and tangled jungle, fragments of the glorious ancient forests. The thick, matted forest growth formerly covered the mountains to their summits. All natural factors favored this dense forest growth, and as long as it was permitted to exist the plains at the foot of the mountains were among the most fertile on the globe, and the whole country was a garden.

"Not the slightest effort was made, however, to prevent the unchecked cutting of the trees or to secure reforestation. . . . The big trees disappeared centuries ago, so that now one of these is never seen save in the neighborhood of temples, where they are artificially protected; and even here it takes all the watch and care of the tree-loving priests to prevent their destruction."

NEWS ITEMS.

Professor John M. Coulter, of the University of Chicago, and his family were on the steamer Republic during the recent collision with the Florida. Professor Coulter lost the manuscript of his proposed new book on gymnosperms. He expects to resume his journey soon; he had originally planned to attend the Darwin celebrations in England.

The University of Wisconsin is to build on its campus a building suitable for the United States Forestry Service, thus enabling the Service to concentrate its western laboratories, and carry on a series of investigations on timber, lumbering, the making of wood pulp, and the utilization of present by-products. The government will in return equip the building and provide for lectures to students at the university.

A series of nine lectures on Charles Darwin and his influence on science are being given Friday afternoons, at 4 P. M., in 309 Havemeyer Hall, Columbia University. The first two on "Darwin's Life and Work" by Henry Fairfield Osborn and "Terrestrial Evolution and Paleontology" by William Berryman Scott, have been given. The others are: "Darwin's Influence on Zoölogy" by Thomas Hunt Morgan, February 26; "Darwin in Relation to Anthropology" by Franz Boas, March 5; "Darwin's Contribution to Psychology" by Edward Lee Thorndike, March 12; "Darwin's Influence on Botany" by Daniel Trembly MacDougal, March 19; "Darwinism and Modern Philosophy" by John Dewey, March 26; "Cosmic Evolution" (date subject to change) by George Ellery Hale, April 2; and "Darwinism in Relation to the Evolution of Human Institutions" by Franklin Henry Giddings, April 16.

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BOTANICAL OBSERVATIONS IN ICELAND AND SPITZBERGEN *

By Julia T. Emerson

In July of this year the writer was so fortunate as to have the opportunity of visiting some of the islands of the northern seas of Europe, and it is hoped the following notes may prove of interest to others who are as ignorant of the countries seen as the writer was.

The steamer was in port often for a few hours only, in one or two places for thirty-six hours, and the excursions on land never went far inland or off the regular roads. A small trunk already well filled, and nothing but a life preserver to press specimens with made it necessary to keep the collections very small; therefore the list of plants observed does not pretend to be complete, especially as the writer was unfamiliar with the flora of northern Europe.

After a couple of days in Edinburgh, one being spent in the city and the other in a hurried trip through the Trosachs, we reached Kirkwall in the Orkney Islands in the middle of the day. Substantial stone or brick houses with small windows and little yards or gardens made a typical Scotch town. The sycamore maple and the beech were the most conspicuous trees, and they were evidently glad of the shelter of houses, for exposed specimens were blown sideways by the strong winds, and the surrounding hills looked bare of trees or shrubs. All the seasonable vegetables and flowers were growing in the cultivated grounds near the town, but as the old Saint Magnus Cathedral and the ruins of the bishop's and the earl's palaces were well worth looking at there was no chance to get into the real country.

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* Illustrated with the aid of the Catherine McManes fund.

Thorshavn, Faroe Islands

A misty, cool day and the few trees or cultivated flowers made us feel as if we were getting rather far north. Perhaps the many rocks and high winds discouraged farming or else fishing was a more profitable industry; at any rate the season was late and probably short, although the friendly fisherwomen declared they did not have a cold winter, and that it frequently was no colder than the day we were there. Grass was luxuriant on the sodded roofs of many of the tiny houses of the very picturesque little settlement, and some of the spring flowers were still in bloom — such as buttercups, marigold, forget-me-not, daisy, *Viscaria vulgaris*, and a pink stone crop. A species of *Sorbus*, broad leaved willow, mountain ash, alder, hawthorn, and maple, grew behind buildings, and in the yards were rhubarb, potatoes, and gooseberries. Some people who had gone inland came back with orchids, somewhat like the English *Orchis pyramidalis*, in their button-holes, which showed that a walk on those bare hills might lead to interesting discoveries. All the inhabitants turned out to receive us and were so cordial and clean, that in spite of the difficulties of speaking Danish we would have been tempted to remain for a few days had it been possible.

On leaving Thorshavn our course took us through our first fiord, between Stromoe and Osteroe, and it was all the more impressive because unexpected. High terraces of bare rocks gave way to mountains with sides so sheer that the sheep seemed clinging to precipices, and multitudes of sea birds rose in whirring clouds from the deep fissures, startled by the unaccustomed sound of our whistle. The hills crowded in upon the waters until we could toss a biscuit ashore on either side; clouds hung low, lifting momentarily to reveal higher peaks beyond; the wind caught in such narrow valleys howled in the rigging, and as we had a glimpse of open sea through two majestic, jagged guardians of this gloomy passage, all the blasts of Boreas at once bore down upon us, and threatened rough waters outside — but instead the waves were not ruffled, the sun came out and the wind went as abruptly as it had come, while we went on our way to Iceland awed by such a strange farewell from those volcanic islands.

Iceland

Pointed snow summits emerging above pink clouds and blue water was our first picture of Iceland, and all one wonderful day we watched the mountains assume more solid form, and could scarce believe our eyes when we came abreast of the vast Jokull ice fields which reached very nearly to the sea; gradually the coast became less wintry in aspect, and as we got around to the west side and passed between the Westmann Islands we could see grass on the hill slopes.

The approach to the harbor of Reykjavik was during a ten o'clock simultaneous sunset and moon rise, and our anchor was hardly down before we were greeted by a boat load of young women and men, who made a circle of our ship singing their native songs. The town of Reykjavik has no beauty; the houses are of wood covered with corrugated iron as a protection against fire, and have none of the picturesqueness of the little fishing village of Thorshavn. The harbor was large and occupied by a number of whaling or fishing boats, and on a clear day must have been rather fine in its setting of snow-patched mountains, but clouds hung low on the 11th of July veiling the sun sufficiently to interfere with taking photographs. The country around the town was destitute of trees or color, and the hills were not high enough to be impressive. Even a New England farmer would be in despair at the stones of Iceland, and one is surprised to see any grass or plant growth when one looks at the unpromising soil, if it can be called that. I believe the flowers and vegetables I saw in the yards in the town must have been grown on imported earth, and yet there were little fields of fairly thick grass which was most carefully cherished as hay for the ponies. One man came to the gate of his yard when he saw me looking at his garden, and we had a peculiar talk, he knowing no English and very little German and I no Danish, so the Latin names of the plants furnished our means of communication. His plants looked as if they had been set out about a year, and I understood that they were not all native and certainly the trees were dwarfed and pathetic in appearance; he had growing the mountain ash and sycamore maple both 5–6 feet tall, *Ribes alpina*,

Lonicera (?) in bloom, rhubarb, potatoes, poppies, and young cabbages, *Caragana Sibirica*, and either a geranium or a malva. In another garden I observed tulips, phlox, forget-me-nots, *Sorbus*, and, on a new lawn, a bunch of *Corprinus*. On a drive a couple of miles inland to see the hot springs where the women wash their clothes, I noticed patches of pink thyme in among the stones, and, where the ground was wet, cotton grass and real grass and a number of little inconspicuous things were taking

FIG. 1. On the road between Reykjavik, Iceland, and the Salmon River. Pink thyme, *Statice* and *Silene maritima*, *Polygonum viviparum* and some other little plants growing in scattered clumps among the stones.

advantage of favorable conditions, such as *Statice maritima*, *Silene maritima* and *S. acaulis*, *Polygonum viviparum*, *Alchemilla alpina*, *Galium verum*, and *Tofieldia palustris*.

There was a pony race in the afternoon after a very good concert, and it took place on a great level plain which was one mass of little stones with about a dozen plants in a square yard; a desolate spot but gay with people gathered from the ends of the

earth watching those sturdy, fleet little horses scamper over the course.

Akreyri

As the clouds lifted in the late afternoon of the 12th we found we were close to the north coast, which here shows plainly its volcanic origin as the mountains were craters or half craters of considerable height and regularity, every basin and flank touched with patches of snow; and it was surprising how level the layers of rock or lava deposits were, seldom tipped or broken though worn by weather into cathedral columns, or when painted by the

Fig. 2. Bell Sound, Spitzbergen; in foreground *Saxifraga, oppositifolia, Dryas octopetala* and *Cassiope tetragona*.

rosy rays of a low evening sun, turned into veritable Valhallas, fit abodes for northern heroes. We wound far up a beautiful fiord to a whaling station and saw four dead monsters, and met another being towed in by a little tug hardly bigger than the whale. The settlement of Akreyri, which is called the second largest town of Iceland, is situated at the end of a long fiord and surrounded by high hills, which here have retreated a short dis-

tance from the water, leaving lower grassy slopes which make good farms for the fishermen. As at Reykjavik there was nothing attractive about the little town, and we all walked a mile inland to a brisk river which took a thirty or forty foot plunge into a small canyon. It was refreshing to sit near the falls as it was a warm day, and here was the best collecting ground I had found, both for flowering plants and mosses. *Dryas octopetala* was very pretty and common; *Eriophorum angustifolium* and *E. vaginatum*, *Parnassia palustris*, and *Viola tricolor* made bright spots of color; and *Pinguicula vulgaris* was in cracks of the damp rocks, where *Racomitrium lanuginosum* and several *Grimmias* were mixed with *Distichium capillacium*, *Timmia austriaca* or *Philonotis fontana*. There were also *Empetrum nigrum*, *Galiums*, *Erigeron alpina*, *Silene acaulis*, and yarrow, dandelions, and sorrel, but no trees or shrubs.

It took us three hours to steam out of the fiord and about 7 P. M. we crossed the Arctic circle and had a call from Neptune, who invited us to be present at the baptismal ceremonies on deck the next afternoon, and then he disappeared astern floating away in a smoking barrel. We could scarcely believe we were within the Arctic circle it was so mild, only 55° F. on deck after dinner, and the sun gave up any attempt at setting. The next two days at sea however were cooler, and in the evening we sighted an ice floe off to the northwest where Greenland was not very far away, and the thermometer said only 39° F.

Spitzbergen

It was pleasant to have reached a place where the birds were so tame and so numerous as at Advent Bay. There were funny ones, puffins I think, which could not rise from the water but flapped their wings frantically and half walked in a zigzag path, graceful gulls often sitting on the icy water within ten or twenty feet of the boats, and many others I did not know, and all in great numbers. The island is well named Spitzbergen, its peaks are generally very pointed, very steep and pretty much covered with snow, and the valleys are filled with great glaciers whose ends break off into the waters of the Bay, which is also said to be the

terminus of the Gulf Stream. There was little floating ice, it was too late in the season. A couple of whaling boats, a steamer come to get coal from a mine recently opened which has remarkably good, hard coal, and, on the land, the mining buildings and one or two houses for the workmen, and a shanty put up for the occasional hunter, were the only signs of life in this great arena of dazzling snow, black rocks, and blue water. We brought with us the best day the isolated men had had for the year, and our pilot, a whaler of forty years experience, declared the bay was more open and the seas quieter than he had ever known them.

FIG. 3. Merok, in the Geirangerfiord, Norway. The tree is a white birch, and there are plenty of flowers and grass and other birches part way up the mountains, which are perhaps 4,000 feet high.

We went ashore merely to say we had set foot on Spitzbergen, and wondered why otherwise we took the trouble, it looked so uninteresting. At the point where we landed there was a plateau of great extent about six feet above the level of the shingle beach, and composed of flat stones, probably left by a retreating glacier; what had looked like a barren field of rock proved to be

a garden with many dainty little flowers about six inches high, which forced their way between the stones. Here were the Iceland poppy (*Papaves radicatum*), *Saxifraga oppositifolia*, either pink or white and with a delicate odor, *Pedicularis lanata*, *Potentilla emarginata*, and *Pulchella*, and *Cerastium Edmonstoni*, these last three very hairy, *Dryas octopetala*, a *Draba*, perhaps *lapponica*, and *Cassiope tetragona* making quite a turf or bog where melting snow was near it, and with it the tiny *Salix retusa*. There were a number of mosses but none with fruit, and I brought back specimens of only *Polytrichum gracile*, *Hypnum uncinatum*, and of *Grimmias* not yet identified. The *Pedicularis lanata* was most beautiful growing on the very edge of a snow bank, nestled in between the stones and daintily protected by its veil of grey hairs, through which the pink of the waiting flowers shone.

Many of the climbers achieved the summit of the nearest mountain, and it was appallingly steep as we looked at their progress from below, over the sliding, wet stones, with no ledges or trees to afford a foothold and a deep ravine with a milky river rushing far below them. When they were ready to come down they sat down on the snow and coasted, and we on a much lower shoulder found it the best way to get over the half melted banks we encountered. The light for taking photographs was better at I A. M. than it had been twelve hours earlier when we came into the bay, and we all stayed up to see the weighing of the anchor and the sun at our northernmost point of the trip ; and indeed, it was the night of nights to stay up there was so much that was beautiful and strange to see.

Later in the morning we woke at *Bell Sound*, a favorite harbor of whalers, where three or four immense glaciers empty into one little bay. Here again we had marvellously clear skies and were deceived as to distances, so opinions varied as to the breadth and height of the glaciers, whether two miles or five, and forty feet or one hundred in height. Unfortunately there was not time to walk on any of the glaciers. Perhaps the Captain felt such weather was too good to last long, so we sadly bade adieu to the regions of clean snow and magnificent distances, and in a

couple of days, towards eight o'clock one evening, first beheld that great rock called the North Cape of Norway.

North Cape

It seemed like being in the tropics to see such a luxuriant growth of grass, butter-cups, geraniums, sweet yellow violets, pink campion, saxifrages, etc., as were wild in the somewhat sheltered valley up which the exceedingly steep path zigzagged to the flat top of the great cliff. But the first steps on the wind-swept stony summit were as devoid of plants as the plains of Iceland had been. Walking to the very edge we looked off to the sun just at its lowest point for that night, it being then twelve o'clock, and proved the photographer's warning useless in this instance for we could take pictures when the sun was just at setting or rising. From this height of about 900 ft. there was a fine view of the other bays and headlands, only less tremendous than the one we were on, of which the coast is composed.

In the Lyngenfiord still well to the north of the Arctic Circle, we spied our first trees, white birches, and many other flowers; and here too we visited the Laplanders in their summer camp in a beautiful valley within sight of a fine glacier. At Digermulen on the Lofoten Islands we climbed a mountain about 1,100 ft. high to get a view of many fiords and islands and snowy summits, and on the way up noticed the following plants: *Calluma vulgaris*, white heather or lyng, which is supposed to have suggested the name of the Lyngenfiord, violets, *Cornus suecicia*, *Lotus corniculatus*, which I had last seen in bloom on the South Downs of Sussex in early June, *Trientalis Europoea*, *Vaccinium*, *Vitis idaea*, *Andromeda polyfolia*, very fresh pretty pink, *Rubus chamaemorus*, and dwarfed willows, and *Betula nana*, also many mosses and ferns.

I will make no attempt to enumerate the flowers in the remaining places we visited, because they were too many and are well known to anyone familiar with the European flora or even with the English country at this season of the year, but must mention two places we stopped at because of their surpassing beauty. Merok is at the end of the very narrow Geirangerfiord

and is like a gem of deep blue-green color in a setting of lofty, jagged mountains, whose lower parts are good farms well watered by countless falls and brimming brooks. The other is Gudvangen and Stalheim, which we reached by driving eight miles up the Naeroedal, a valley at the base of mountains 4,000–5,000 ft. almost sheer from sea level, and so close together that our necks ached with the effort of seeing their summits. At the end of the drive we walked up the winding road to the Stalheim cliff and hotel, from which we had a fine view down the narrow valley and the many mountains one behind the other until they faded into the blue distance. Those two places were a fitting conclusion to a most interesting journey and are within easy reach of Bergen. In the little botanical garden in Bergen I found in flower and named some of the plants I had noticed in the yard of the man in Reykajavik.

I am indebted to Mr. Rydberg for naming the plants I brought back, which are now in the New York Botanical Garden herbarium.

NOTES ON UROMYCES

By John L. Sheldon

In the spring of 1906, I found an *Uromyces* on a number of plants of *Sisyrinchium graminoides* Bick., usually associated with *Aecidium houstoniatum* Schw. on *Houstonia caerulea* L. Mention has been made of this in a previous number of Torreya,[1] together with a description of the *Uromyces* and the results obtained from inoculations made in the field. Observations and inoculation have been kept up for the past three years. Successful inoculations of plants of *Sisyrinchium graminoides*, with aecidiospores from *Houstonia cærulea*, have been obtained each year. During the winter and spring of 1907, I finally succeeded in obtaining aecidia on a few plants of *Houstonia caerulea*, grown in the greenhouse and inoculated with teleutospores from *Sisyrinchium graminoides*. These results showed that the *Uromyces* and the *Aecidium* are different stages of the same rust. And

[1] A rare Uromyces. Torreya **6** : 249–250. D 1906.

according to the system of nomenclature in use at the present time, the name becomes *Uromyces houstoniatus* (Schw.) n. n. If the system of nomenclature proposed by Professor J. C. Arthur is followed, then the name becomes *Nigredo houstoniata* (Schw.) n. n.

One of the most interesting things in the life history of this rust is that the teleutospores germinate in the living leaves of *Sisyrinchium* and probably infect plants of *Houstonia* during the summer and autumn, the mycelium remaining dormant until the following spring when aecidia develop. In so far as I have been able to ascertain, species of *Uromyces*, whose teleutospores germinate in living leaves, rarely have an aecidial stage.

I have tried several times to inoculate *Sisyrinchium graminoides* with aecidiospores from *Houstonia purpurea* L., both in the field and the greenhouse, but without definite success. Whether the plants were not susceptible at the time the inoculations were made, or whether the *Aecidium* of *H. purpurea* is not the same as the one of *H. caerulea*, I am unable to say. I have shown elsewhere* that there is considerable difference in the susceptibility of plants to infection by rusts, even the same plant, at different times. I have repeatedly observed a marked difference in the susceptibility of *Trifolium pratense* L., *T. hybridum* L., and *T. repens* L. to infection by *Uromyces trifolii* (A. & S.) Wint. When one of these was seriously injured by the rust, the other two, growing beside it so that their leaves intermingled, were not affected by the rust.

Last spring I noticed that there were abundant aecidia on a blue violet growing beside *Andropogon virginicus* L. having *Uromyces andropogonis* Tracy on the dead leaves and stems. To test whether the *Aecidium* was related to the *Uromyces*, pieces of the rusted grass were collected and taken to the laboratory. The next day the pieces of grass were distributed through five clumps of the same kind of violet. Two weeks later yellow spots began to appear on the leaves of each clump, followed by aecidia. In all probability, aecidia on certain species of *Viola* have been determined as those of *Puccinia violae* (Schum.) DC.

* Preliminary studies on the rusts of the asparagus and the carnation: Parasitism of *Darluca filum*. Science, N. S. **16**: 397. 235–237. 8 Ag 1902.

when they should have been determined as those of *U. andropogonis.*

WEST VIRGINIA UNIVERSITY,
MORGANTOWN, WEST VIRGINIA

REVIEWS

Willis's Flowering Plants and Ferns*

The publication of a third edition calls attention to this handbook in the Cambridge Biological Series as a book which is probably not so widely known in this country as its usefulness might warrant. The preface states that the book is aimed to supply such information about the plants met with in a botanical garden or museum, or in field work, as is required by any but specialists. The introduction contains helpful notes on field work and collecting. Following this, about one hundred pages are occupied with a brief and somewhat categorical account of general morphology and physiology, the paragraphs on nutrition, in particular, being rather inadequate. The constant emphasis on the phylogenetic point of view gives the discussion of morphology a suggestive value for teachers. This standpoint is further emphasized in the chapter on evolution and classification. In a two-page note at the end of the first part, the author announces his conversion to the theory of mutation, giving a brief but effective apology for this change during the publication of the work. The other chapters of this part are devoted to useful summaries of plant geography and economic botany.

The second and larger part of the book (covering over 400 pages) is a dictionary of "the classes, cohorts, orders, and chief genera of the flowering plants and ferns." It is unfortunate that this "provincial" group-terminology is retained, in view of the general use in America and in the best Continental works of the terms order and family, as prescribed in the Vienna Code, though even the makers of that Code had not arrived at a full appreciation of the desirability of uniformity in ordinal terminations.

* Willis, J. C. A Manual and Dictionary of the Flowering Plants and Ferns. 12 mo. Pp. xii + 714. 1908. [3d ed.] Cambridge, University Press.

Part III consists of a glossarial index, including English names. Although the preface states that this edition has been enlarged to bring in colonial and American names of plants, yet the absence of such names as *Dryopteris*, *Stenanthium*, *Philetria*, *Filix*, and *Gyrostachys*, as well as scant mention of American works in his bibliography, suggests that the author is not very familiar with our manuals or journals. Nevertheless, this dictionary, especially as regards plants growing outside of our region, may be commended as a very convenient and valuable reference hand-book for American teachers and students.

TRACY E. HAZEN

BARNARD COLLEGE,
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PROCEEDINGS OF THE CLUB

JANUARY 27, 1909

The meeting was held at the Museum of the New York Botanical Garden at 3:40 P. M., President Rusby in the chair. There were 17 persons present.

After the reading of the minutes of the meeting of January 12, Mr. Fred. J. Seaver was nominated for membership.

The President appointed the following committees for the year 1909.

Finance Committee: Addison Brown and H. M. Richards.

Program Committee: Fred. J. Seaver, Tracy E. Hazen, Miss Jean Broadhurst, Charles L. Pollard, and Mrs. E. G. Britton.

Field Committee: Norman Taylor, E. B. Southwick, and Wm. Mansfield.

Committee on Local Flora: N. L. Britton, Chairman; *Phanerogams*, — N. L. Britton, C. C. Curtis, Eugene P. Bicknell, K. K. Mackenzie, E. S. Burgess, and E. L. Morris. *Cryptogams*, — Wm. A. Murrill, Mrs. E. G. Britton, Tracy E. Hazen, M. A. Howe, and Philip Dowell.

The scientific program consisted of two papers of which the following abstracts were prepared by the authors.

"Studies in the Embryology of the Mistletoe, *Dendropemon*", by Miss Mary M. Brackett.

This study was made from two species of Loranthaceae — *Dendropemon caribaeus*, gathered by Prof. F. E. Lloyd from lime trees in Dominica, and *Dendropemen parvifolius* collected by the writer from the bitter-broom, *Baccharis*, at Cinchona, in the Blue Mountains of Jamaica.

The flowers of *Dendropemon* are perfect, regular, and symmetrical. The buds form in clusters of three in the axils of the leaves, and are protected by bracts. The corolla consists of six petals, which, in *D. parvifolius*, are of a reddish color on the outside, and a delicate pink within. There are six stamens borne upon an inferior ovary, the three fertile stamens alternating with three sterile stamens. The flower has one style and one stigma. At the top of the ovary is the cup-shaped calyculus.

At the time that the corolla and stamens appear as rounded knobs, two carpellary leaves meet over a central placenta, forming a cavity. The carpellary and placental tissues gradually unite, filling the cavity. Growth in the length of the pistil begins to be rapid, and the stamens develop. During this time cell division is going on in the region of the nucellus. There is, however, nothing to mark the development of an ovule as a distinct organ, nor is there any indication of integument. In the center of the ovary the cells increase in number and size and contain large nuclei. They elongate parallel to the main axis, become irregular, and constitute the archesporial tissue. Their growth is accompanied by periclinal division in the adjacent cells. Several large archesporial cells form megaspores; the neighboring cells become disorganized and gradually disintegrate. Apparently only one of the megaspores becomes an embryo-sac.

The embryo-sac was not made out in these species, but a long slit was observed reaching from the center of the ovary into the tissues of the style, which it seemed, had been occupied by the embryo-sac. Of this Hofmeister says (*Neue Beitrage zur Kenntniss der Embryobildung der Phanerogamen*, 539, 1859). "The growth in length of the embryo-sac is not ended with its formation. The sac makes its way through entangled cells of the closed style to a quarter of its length upwards."

Young stages of the proembryo were observed composed of

four, and then of six cells in two parallel rows, with the long suspensor, of three greatly elongated cells, reaching into the tissues of the style for nearly half its length.

The embryo occupies a vertical position in the center of the berry, and from its position in the surrounding tissue, suggests all the characters of an orthotropous ovule. As the embryo develops, it is surrounded with endosperm. A change in the nature of the tissue below the embryo suggests a series of conducting cells between the embryo and the starch-filled cells in the lower part of the ovary. The cotyledons become green, and the suspensor gradually disappears, except for a few capping cells at the anterior end of the embryo, which now occupies the ovarial cavity for almost its entire length.

The points of particular interest are: the rapid disintegration of the cells of the gynoecium before and after fixation, the lack of an ovule as a distinct organ, the lack of integument, and the green color of the embryo as it lies in the berry.

"Botanical Observations in Iceland and Spitzbergen", by Miss Julia T. Emerson.*

Dr. Britton showed a photograph of a new and interesting cycad collected by Dr. MacDougal and Dr. Rose in Tomellin Cañon, Mexico, in 1906. The plant was sent to the New York Botanical Garden and installed in the propagating houses, where it remained for two years before showing any signs of growth. This appears to be a new species of *Dioon*.

Dr. Murrill exhibited a number of tropical fruits obtained on his recent trip to Jamaica.

The Club adjourned at 5:10 P. M.

PERCY WILSON,
Secretary

FEBRUARY 9, 1909

The Club met at the American Museum of Natural History at 8:15 P. M. and was called to order by President Rusby. The attendance was 20. After the reading and approval of the minutes of the preceding meeting, resignations were read and accepted from Mr. LeRoy Abrams, Mr. W. Ralph Jones, and Mr. John M. Holzinger.

* Printed in full in this issue of TORREYA. — EDITOR'S NOTE.

Mr. Ewen MacIntyre was nominated for membership.

The announced paper of the evening on "The Rubber Forests of Mexico" was then presented by Dr. H. H. Rusby. The lecture was illustrated by lantern slides made from photographs, many of which were obtained by the speaker while in the field. This paper has been printed in full in the January number of the Journal of the New York Botanical Garden, and an abstract accompanied by illustrations will appear at an early date in TORREYA.

The meeting adjourned at 9:40 P. M.

PERCY WILSON,
Secretary

OF INTEREST TO TEACHERS

COLLEGE ENTRANCE BOTANY

A fourth report on the college entrance course in botany has been formulated by the Committee on Education of the Botanical Society of America. In authorizing the publication of this report * the Society urges that a year's thorough work in botany be accepted by *all* colleges as an "entrance option" for under the present educational conditions it is "practically impossible for any subject to receive suitable consideration in the three upper years of most high schools unless it can be counted for entrance to college."

The "ten principles upon which the course is formulated" are given below, and the general statement of the subject-matter will, for lack of space in this issue, be printed next month. The preparation of such a course of study is not an easy matter; and the work of the members of the committee, Professor W. F. Ganong, of Smith College, Professor F. E. Lloyd, of the Alabama Polytechnic Institute, and Professor H. C. Cowles, of the University of Chicago, should receive our hearty appreciation. Thanks are also due the Society for the effect such a course will have upon the teaching of botany in the high schools — both directly and indirectly. What do the teachers of high school

* The School Review, Vol. 16. November, 1908.

botany think of the following principles upon which the course is based? From them the committee should receive most helpful criticisms. Here, as indicated by the committee in the last paragraph of this paper, is an opportunity by the high school teachers to help form the "college requirements" which are so generally denounced in all secondary subjects.

PRINCIPLES UPON WHICH THE COURSE IS FORMULATED

1. It is founded upon the two important reports of the National Educational Association — the "Report of the Committee of Ten" (Washington, 1893), and the Report on College Entrance Requirements (Chicago, 1899). These have been modified in accord with the results of more recent experience, and the advice of leading teachers.

2. While intended primarily as an option for entrance to college, it is designed equally for the education in the high school of the general student who can follow the subject no farther; there are in botany no advantages in having the college preparatory and the general educational courses different, at least none that are at all commensurate with the additional burden thus laid upon the schools.

3. It is designed to yield a mental discipline fully equal in quality and quantity that yielded by any other subject studied for the same length of time.

4. It should, if possible, have as a foundation a considerable body of botanical fact learned through nature-study in the lower schools; it should be given in one of the three upper years as part of a four years' high-school course in the sciences: it should be considered and treated as an elementary or preliminary course leading to second courses in college, and colleges accepting the option should arrange second courses to articulate economically with it.

5. The immediate plan of its construction is very simple, namely, to include those topics in the leading divisions of the subject which most teachers now regard as fundamental, whether for their value in scientific training, or as knowledge; but the individual teacher is left free to follow his own judgment as to sequence

of topics, text and other books, and special methods. Advice is occasionally offered, however, upon important points in which most teachers are now known to agree.

6. It recognizes the existence of, and provides for, two modes of procedure in the sequence of topics. In one, which is that strongly advised by the committee, the general facts of plant structure and function, permitting a beginning with large and familiar objects and phenomena, are first studied, to be followed later by a study of representatives of the groups of plants from the lower to the higher ; in the other the study of the groups is the backbone, as it were, of the course, which begins with the lowest forms and introduces the physiological and morphological topics at appropriate places in the ascending series. The two modes, however, lead to substantially the same result, and a common examination is practicable for both.

7. The amount of work in the course is designed to occupy a a year of five periods a week under good conditions. Where special circumstances, such as exceptional difficulty of obtaining material, etc., prevent the completion of the entire amount while allowing its equivalent in thoroughness, it is recommended that some of the minor topics here and there be omitted rather than that the attempt be made to cover all superficially. To provide for this possibility the examination papers should always include a number of alternative questions.

8. The time per week, inclusive of recitation, preparation, and laboratory should be the same as for any other subject. Where five periods a week, with an hour of preparation for each, are demanded for other studies, this course should receive the equivalent of two recitation periods with their preparation, together with three double (not six separated) periods in the laboratory. Variation from this should be towards a greater, not a lesser proportion of laboratory work. The preparation of records of the laboratory work, in which stress is laid upon diagrammatically accurate drawing and precise and expressive description, should be regarded as an integral part of the course ; and these records, preferably in a notebook, should be counted at least one-third towards the students' standing.

9. The course is arranged in two parts, each occupying a half-year and complete in itself. This is in part to accord with principle 6, preceding, and in part to allow either a combination of a half year of botany with a half year of zoölogy to form a year's course in biology, or else to provide a shorter course as needed in some schools. In any case a half-year course in botany should consist of Part I or Part II, never of a combination of both, a recommendation based partially upon educational principle and partly upon the practical difficulty of providing examinations and articulating later college courses with such diverse combinations.

10. The course is intended to be relatively permanent, yet is modifiable in adaptation to changing educational conditions and the approved results of experience. Changes will not, however, be made for some time, and not until announced in a fifth edition of this report. The committee will welcome all suggestions and criticisms.

Those interested in the theories of sex-heredity will find an interesting paper on "A Mendelian View of Sex-heredity" by Professor W. E. Castle, of Harvard, in *Science*, for March 5, 1909; in this paper Professor Castle brings "into harmony the seemingly discordant results of Wilson, of Correns, and of Bateson and his associates."

NEWS ITEMS

A company called "The Luther Burbank's Products Company, Incorporated" has recently been formed with a capitalization of several million dollars. The company will attend to business matters connected with Mr. Burbank's work, and control the distribution of his new productions.

Dr. N. L. Britton, director-in-chief of the New York Botanical Garden, accompanied by Mrs. Britton and Dr. Marshall A. Howe, curator of the museums, sailed for Jamaica, February 20. They expect to spend about six weeks visiting the eastern parts of Jamaica and Cuba, and possibly some of the southwestern Bahamian islands.

Two new national forests were recently created by President Roosevelt. One is the Ocala National Forest in Marine County, in eastern Florida, the first created east of the Mississippi River, and it contains over 200,000 acres, well adapted to the growth of sand pine. The second is the Dakota National Forest in Billings County, North Dakota, and it consists of over 14,000 acres in the Bad Lands region, part of which are to be used as an experimental field for forest planting. It is to be hoped that these Dakota nurseries may prove most successful, as North Dakota has a lower per cent. of forest land than any other state — about one per cent.

The first number of *Mycologia*, a new journal devoted to fungi and lichens, was issued in January, 1909. Dr. William A. Murrill, of the New York Botanical Garden, is the editor. Many well-known mycologists appear as associate editors ; and several others have promised their support. Although undertaken in continuation of the work formerly done by the *Journal of Mycology*, edited by the late Professor Kellerman, *Mycologia* has not assumed any of the obligations of the publisher of that journal. The main features of the new journal will be, first, technical articles of value to investigators in pure or applied mycology, second, popular articles of interest to the fungus-loving public, third, good illustrations, many of them in natural colors, fourth, news and notes, largely relating to literature of interest to American students.

TORREYA

April, 1909

Vol. 9 No. 4.

THE DISTRIBUTION OF THREE NATURALIZED CRUCIFERS

By E. J. Hill

Late in the autumn of 1906 I noticed a strange cruciferous plant in a vacant lot near my home on the south side of the city of Chicago. It was growing by the sidewalk and had been subject to such severe treatment by children who use such spaces for playgrounds that I was not certain as to its specific identity, except that it was a *Diplotaxis*. It was not observed the next season, but it had survived and good specimens were obtained the past summer which showed it was *D. muralis* (L.) DC. I have not seen it elsewhere nor heard of its presence hereabouts from others. The range accorded it in Britton and Brown's Illustrated Flora (1897) is: "Waste places and ballast, Nova Scotia to New Jersey and Pennsylvania, chiefly about cities." This is substantially repeated in Britton's Manual (1901). The Gray's New Manual (1908) says: "About Atlantic ports and rarely inland," but without specifying how far from the coast. In Beal's Michigan Flora (1904) a single station is given, Grand Rapids, about the same distance from the coast as Chicago. Not having been mentioned in previous editions of Gray's Manual, it may be regarded as a comparatively recent introduction. As the migration of adventive plants is a matter of interest it seems well to record its appearance here.

In 1890 I recorded the finding of another cruciferous plant, *Nasturtium sylvestre* R. B., since called *Roripa sylvestris* (L.) Bess, and which now has another name, *Radicula sylvestris* (L.) Druce, the common yellow cress. It was growing in the low ground adjacent to Salt Creek, a tributary of the Desplaines

[No. 3, Vol. 9, of Torreya, comprising pages 45–64, was issued March 26, 1909.]

River, and along the highway that crosses the creek not far from Western Springs, a few miles west of Chicago. Since then it has spread throughout the region, being abundant by water courses, and especially so by the low margins of the Desplaines to Joliet and below. It should now be looked for southwest of here along the Illinois and perhaps the Mississippi, to which rivers the Desplaines is tributary. As it does not require wet grounds exclusively for prosperity, but may do well by moist roadsides or even on drier railway embankments, creeping up probably from near by ditches, it has still another means of distribution.

This plant seems to have received its first notice in American botany in 1818, both by Nuttall in his Genera (**2**: 68), and by Barton in his Compendium Florae Philadelphicae (**2**: 55), both published that year. It was not mentioned by Barton in his earlier work, Prodromus of the Flora Philadelphica (1815), nor in Muhlenberg's Catalogue (1813), nor in Pursh's Flora (1814). Taking these dates as a starting point, it may be concluded that it was introduced into this country not far from that time, since otherwise it could hardly have escaped the eyes of those who then represented the most active botanical center in the land. Under the name of *Sisymbrium vulgare* Persoon (*sylvestre* L.), or the creeping water rocket, Nuttall states of it: "On the gravelly banks of the Delaware, near Kensington, Philadelphia. Introduced? Agrees exactly with Sir J. E. Smith's very accurate description, Flor. Brit., 2, p. 701. I have never before seen it in America." Barton, under *Sisymbrium sylvestre* L., says: "This plant covers large patches of ground on the low wet margins of the Delaware, just above Kensington; and it has every appearance of being a native there. It is not improbable, however, that it has been accidentally introduced in that neighborhood, where at least it is unequivocally naturalized. I have this summer found young leafing specimens four miles higher up the Delaware." From the tenor of this and from the question mark used by Nuttall it would seem that there was some doubt about its foreign origin. In Torrey and Gray's Flora of North America (1838–40), under *Nasturtium sylvestre* R. Br., Philadelphia is the only station mentioned, Nuttall being cited

as authority. So also in Eaton and Wright's Botany (1840), and Wood's Class-Book (1854). In Gray's Manual (1856) it appears with an additional station, the entry being: "Wet meadows near Philadelphia and Newton, Mass., *C. J. Sprague*." In the fifth edition (1868) the range had been extended, as we read: "Massachusetts to Virginia, rare." This is repeated in the sixth edition (1889). In the Illustrated Flora (1897) the range is still further extended. "Occasional from Massachusetts and Virginia to Ohio." In Britton's Manual (1901) the range is "Newf. to Mass., Va. and Mich." It had found a place in Beal's Michigan Flora (1904) but was not in the preceding catalogue of Beal and Wheeler (1892), the single station being Detroit. In Kellerman and Werner's Catalogue of Ohio Plants (1893) a single station is also mentioned, Painesville, near Lake Erie, or just east of Cleveland.

One cannot from these data make out more than a general movement of the plant north and south, near the Atlantic coast, or westward toward the interior, either from the original station at Philadelphia or from other points of introduction along the seaboard. I find it mentioned for New York in a report of the State Cabinet of Natural History for 1865. The regent reporting on the topic refers to a previous list of Torrey, made in 1853, in which it does not appear, and says, that to his knowledge it had been reported from no other place than the one mentioned, Flushing, Long Island. The authority for the station was Mr. W. H. Leggett, who subsequently, as well as others, gave additional localities for New York and vicinity, as I find recorded in the Bulletin of the Torrey Botanical Club from time to time, up to 1889. One of these by Addison Brown mentions it in 1879, among ballast plants, as if a new introduction by such means in that special case.

Taking the rest of the state of New York, the plants of the central and western parts are quite well represented in four catalogues or floras issued between 1865 and 1896. The first of these is Paine's "Plants of Oneida County and Vicinity" (1865). That of David F. Day, "The Native and Naturalized Plants of the City of Buffalo and Vicinity" (1882), took in most of the territory west

of the Genesee River, as well as a portion west of the Niagara, as its radius was one of fifty miles about Buffalo. The Cayuga Flora of Professor Dudley (1886) was for the basin of Cayuga Lake and some adjoining ground, though covered in part already by Paine's Oneida list. The three lists mentioned do not record the plant. In the "Plants of Monroe County and Adjacent Territory," published in 1886 by the Rochester Academy of Sciences, it is listed for places near the Genesee River, being abundant in some of them. Macoun does not give it in any list of Canadian plants up to 1890, that being the date of some entries as "additions and corrections to parts I–IV" of his Canadian catalogue. I can add as a matter of personal observation, that in the summers of 1882 and 1884 I spent some weeks examining streams, lakes, and ponds in western New York for the study of Najadaceae, but collected other plants as well. The localities were principally south of the area recorded in the Rochester list and east of that of the Buffalo list, being in the counties of Wyoming, Genesee, Livingston, and some adjoining parts of Monroe and Ontario counties. I did not meet with the plant. Judging by the rate at which it has spread since it was first observed in the Desplaines valley, it is not likely to be present in a locality for any length of time without becoming abundant enough to attract attention, since it soon forms extensive mats or beds in favorable localities.

Though the year of discovery is not generally given in the publications cited, the time of publication is covered by ten years for places as widely separated as Rochester, Painesville, Detroit, and Chicago. This is about seventy years after the first notice by Barton and Nuttall by the Delaware. The distribution between these places and the seaboard and between one another, if in any way connected, must be ascribed to other causes than that of steady accretion of area along lines of natural or unaided seed distribution, however this may act in localities where a plant is once established. Nor are the places mentioned so connected by water communication that plants of this character would be likely to traverse the spaces in the reverse direction to the course of drainage, however this may aid when the direction of flow is in their favor. Yet they are on main lines of railway

traffic, and to some extent of lake navigation, if these may have any connection with such seemingly sporadic dispersal of plants. That lines of railway are important factors in plant migration, especially for those of a weedy nature, is readily seen by one passing along their roadbeds. But there are evidently other means by which plants, whose seeds cannot be borne by currents of air, are able to cross widely intervening spaces. For those that grow in water or in the feeding places of migratory birds, seeds lodged in their feathers or in the mud that may cling to their feet is a plausible conjecture for dispersion. The transmission of undigested seed in the alimentary canal of birds is also the source of wide dispersion of plants. But when once established, as in the case of this plant in the Desplaines valley, which has now been under observation nearly twenty years, the natural flow of the water bearing plants or seeds that may be taken up by it becomes a means of the more effectual dissemination in a given area. A specimen collected in 1892 by Dr. W. S. Moffatt on the banks of Salt Creek at Elmhurst has upon the label the statement: "abundant locally, covering several acres of creek-bottom." This being higher up the stream than where I found it in 1890, from its abundance may have been an earlier station and the source of those at Western Springs. Dr. Moffatt in the same connection mentions its presence at Riverside where Salt Creek enters the Desplaines River.

The case with the third crucifer, *Sisymbrium altissimum* L., is somewhat different, as it doubtless came into this region from the northwest; it is given as *S. Sinapistrum* Crantz in Macoun's Catalogue among the additions and corrections to parts I–IV, published in connection with part IV. It had then (1890) been "introduced in a number of places along the Canadian Pacific Railway." The earliest date recorded is 1883, at Castle Mountain, Rocky Mountains. In 1886 it is mentioned as by Lake Superior; in 1889 at a station forty-five miles east of Toronto. The first authentic record I have for Chicago is an unnamed specimen received from Dr. Moffatt, collected at Forest Glen, 1893; it was soon after seen by him in the western part of the city. The first place mentioned is on the Chicago, Milwaukee, and St.

Paul railroad and can well account for the line of introduction. It soon spread to various localities in and around Chicago, though I did not see it in the locality where I reside till 1900. In 1903 I found it common by the side of the Lake Shore and Michigan Southern railroad at Dune Park, Ind., thirty-five miles east of here. It is a quite common weed in the waste grounds of Chicago now. In Beal's Michigan Flora the first date given for a locality is Benton Harbor, 1896. This is on the east side of Lake Michigan, nearly opposite Chicago. The entry is also made, "later in many localities." As the Gray's New Manual states that it is "locally abundant as a pernicious weed" it may be considered as quite generally spread throughout the northern parts of the United States and the southern part of Canada. Since Britton and Brown give it a place as a ballast plant at New York, there may also be other centers of migration from eastern harbors, but the main line has evidently been from the northwest.

The spreading of this weed has been quite rapid, gaining a large area in about twenty years. It produces seeds in great abundance. As I have observed it the height does not generally exceed 5 to 8 dm., that is, not very tall as one might infer from its specific name, though the stature is more or less influenced by the character of the soil. When crowded by its own kind or by other growths it may be very slender and but little branched, but with ample room it is bushy-branched, the diameter equaling or exceeding the height, or of a somewhat globular form, like a tumble-weed. Whether it actually functions as such I have seen no case, but the shape is one that suggests that it could be easily rolled by the wind if loosened from the ground by any means. These are the possibilities of a tumble-weed.

CHICAGO, ILLINOIS

ADDITIONS TO THE PLEISTOCENE FLORA OF NORTH CAROLINA*

By Edward W. Berry

In a previous paper the writer enumerated thirty-eight species, mostly forms which still exist, from the Pleistocene deposits of North Carolina.† Considerable new material, for the most part unstudied as yet, has since been obtained, from which the following have been selected for enumeration at the present time.

Juglandales

Hicoria aquatica (Michx. f.) Britton

Salix sp., Berry Journ. Geol. **15**: 340. 1907.

Additional material has made possible the certain correlation of the specimen previously listed as a willow with this species of hickory. In the modern flora it is a denizen of low river banks and swamps from Virginia to Florida and westward in the Gulf region to Texas. It has not hitherto been found as a fossil,

Station 850, Neuse River.

Fagales

Quercus michauxii Nutt.

This occurrence is based upon fragments of leaves and characteristic acorn cups. In the modern flora it inhabits low, wet situations from Delaware to Florida and westward, but has not been previously obtained in the fossil state.

Station 850, Neuse River.

Ranales

Liriodendron Tulipifera Linné

Berry, Amer. Nat. **41**: 695. 1907.

Winged carpels of this species were recently recorded by the writer from the Pleistocene of Alabama, but leaves have not been previously recorded from American strata younger in age than the Cretaceous, although the genus is common in the Arctic and Eura-

* Illustrated with the aid of the Catherine McManes fund.

† Berry. Journ. Geol. **15**: 338–349. 1907.

sian Tertiary. The present record is based upon abundant and characteristic leaves collected by Dr. L. W. Stephenson from a clay lens in the sands of the Wicomico formation, one and one-fourth miles east of Weldon. One of the specimens is shown in Fig. 1.

FIG. 1. *Liriodendron Tulipifera* Linné, from the Pleistocene of North Carolina.

Rosales

Cercis canadensis Linné

Penhallow, Amer. Nat. **41**: 446. 1907.

The accompanying figure (Fig. 2) shows a characteristic leaf of this species which comes from one and one-fourth miles east of Weldon. It has been previously recorded by Penhallow from the famous interglacial deposits of the Don valley near Toronto and in the modern flora it is said by both Britton and Small to range northward to southern Ontario. Both Sargent and Sudworth give its normal northern range as New Jersey and southern Michigan from which points it ranges southward to Florida and Mexico. It is essentially a warm temperate type, most of its near relatives being subtropical in habitat. Like the present species in this country *Cercis siliquastrum* Linné of southern Europe has been found in the interglacial deposits of France.

FIG. 2. *Cercis canadensis* Linne, from the Pleistocene of North Carolina.

Ericales

VACCINIUM ARBOREUM Marsh

Berberis sp., Berry Journ. Geol. **15**: 343. 1907.

Additional material shows that what was formerly listed as doubtfully referable to *Berberis* is unquestionably the foliage of this species of *Vaccinium*. It is sometimes removed from the latter genus and placed in the genus *Batodendron* of Nuttall. In the modern flora it ranges from North Carolina to Florida and westward to eastern Texas and up the Mississippi to southern Illinois.

Station 850, Neuse River.

JOHNS HOPKINS UNIVERSITY,
BALTIMORE, MARYLAND

HERBARIUM NOTES*

BY PAUL C. STANDLEY

In mounting a considerable number of plants recently the writer had occasion to notice a number of common defects in labels and in herbarium specimens — defects which could easily be remedied by a little care and forethought on the part of the collector; some of these are discussed in the following notes.

Labels should never be printed on stiff paper. Such paper is certain to curl up at the corners and edges unless it is kept under pressure until dry. True, if the corners do curl at first they are usually flat on the sheet after they are thoroughly dry, but they will always be loose and likely to be torn or still further loosened if anything happens to catch on them. It is preferable to use paper that is thin and will not curl away from the sheets when it is wet.

The size, too, deserves consideration. The largest labels that I have seen are about 2¾ by 5¾ inches and some of the specimens which they accompanied had to be broken to keep them from covering parts of the labels. Such pieces of paper require too much time for pasting on the sheet and are not necessary if the labels are filled in by hand, no matter how large a hand the collector may write, and are still less necessary when all the data are printed in. The size most generally used seems to be about 4¼ by 2⅛ inches.

While neatness of labels is always desirable, other ornamentation than the necessary wording is superfluous. This applies to ornamental borders and all advertising of the scenic attractions of the locality in which the plants were collected.

The type used should be plain. The most conspicuous parts of the label should be the name of the state in which the collection was made and the name of the plant. These things are not of so much importance in a small herbarium but when working with

* Illustrated with the aid of the Catherine McManes fund.

a large number of specimens in one of the larger herbaria they will save a great deal of time.

Typewritten labels are not desirable unless black indelible ink is used. The purple and blue ink that is ordinarily used on typewriter ribbons will fade so much in eight or ten years that it will be impossible to read it.

Of course there is every variation in the quality of the specimens themselves, due in part to the climatic conditions of the locality in which they were secured (and very largely to the pressure under which they were dried). The preservation of the original color of the plants is always desirable but not always possible with thick and fleshy specimens, with certain plants in which peculiar chemical changes take place in drying, or in very damp climates.

Here in New Mexico the making of good specimens is a very simple matter providing the proper kind of plants can be found. It is often unnecessary to change the driers for small plants or those which contain little moisture. Some of our best specimens have been made in the following manner: First a drier is placed upon the table; on this is laid a sheet of drying paper upon which the plant is placed; over this another drier, then a sheet of corrugated paper such as is used in packing glassware, etc.; over this another drying paper and specimen, or if one prefers another drier and then the sheet; and so on until a bundle of sufficient size is formed. This is then strapped and thrown out in the sunshine upon the sand and left for several days. It is necessary to tighten the straps occasionally but no other attention is needed unless a rain should come. Excellent specimens can be made in this way, even of the cacti and other fleshy plants. Of course this method is practicable only in a dry region where there is an abundance of hot sunshine. In the mountains frequent changes of driers are necessary.

Most plants which contain considerable moisture will be blackened and consequently ruined if the bundles containing them are placed in the sun and heated to a high temperature before the driers have been changed at least once. If the driers themselves are heated before the plants are placed between them the heat

does not seem to blacken the plants and hastens their drying appreciably.

Too large and too generous specimens are an abomination when it comes to mounting them. It is best to use drying papers a little smaller than the standard size of herbarium sheets; then there will be no difficulty in getting the specimens upon the sheets. Sometimes one receives specimens so large that they must be almost ruined in trimming them down to the size of the mounting paper.

If a sheet contains more material than can be conveniently mounted upon an ordinary herbarium sheet it necessitates the writing of a new label or else the throwing away of the surplus material. The second course is perhaps the better, for it is very seldom that one cares for two sheets of one collection. If one sheet is properly filled it should, except in rare cases, contain material enough for the study of a plant.

Besides the use for corrugated paper mentioned above we have found it useful in mounting. When we are gluing plants upon the sheets we lay a piece of the corrugated paper over the glued plant, corrugated side down, and then a drier upon this, continuing in this manner until we have a pile of sufficient height to be placed somewhere and weighted until the glue has thoroughly dried. The corrugated paper, because of its corrugations, has less surface to stick to the plant and holds it in contact with the mounting paper just as well as the driers or sheets of pasteboard would do.

The accompanying figure shows an end view of a piece of apparatus that we have found very useful for moistening straps in strapping herbarium specimens. It was designed and made by Mr. O. B. Metcalfe, who was formerly student assistant in botany here. *AA* are pieces of wood about 3½ inches long and 1⅛ inches wide; to these is riveted a strip of galvanized iron *C*, which is T-shaped at the ends so as to cover the blocks of wood; upon the wood are tacked two or three layers of ordinary felt drying paper, *BB*; in order to make the paper last longer it is covered with a piece of cloth of medium thickness, *E*. The apparatus is then placed in a small tin pan, *D* (the lid of a baking powder box will

dol, containing a little water. The straps are picked up with a pair of forceps used in applying them to the sheets, and while held in the forceps are laid on the moistened lower pad, while the upper one is pressed down upon it. In this way the straps can be moistened very rapidly and one soon learns to regulate the amount of water in the pan so that they will get just the right amount of moisture.

HERBARIUM OF THE NEW MEXICO AGRICULTURAL COLLEGE

SHORTER NOTES

THE CEDAR OF LEBANON. — I have read the compilation of notes on *Cedrus Libani* in TORREYA, and as usual in similar publications botanists alone are made to figure. William Lithgow, a Scotch traveller, visited the Lebanon Grove in 1611 and found twenty-four trees much burnt in one grove, and spoke of another of seventeen trees nine miles west.

One of the first trees planted in Britain *is* at Bretby, Derbyshire, planted in 1676. The late Sir J. D. Wolff, "Rambling Recollections," Vol. 2, p. 18, seems to have known Rustem Pacha (spoken of by J. D. Hooker) who told him that he replanted the Lebanon Grove with young trees from the Brussels Botanical Garden! (This ought to be easily verified.)

Professor Marquand's tree at Princeton had a fine growth and lots of cones a year or two ago, but remains quite pyramidal (see Downing's 1859 ed.).

JAMES MACPHERSON

TRENTON, NEW JERSEY

SUBMERGED WILLOWS. — My attention was called during the past summer to an interesting illustration of the tenacity with which our common willows cling to life. An artificial lake was formed in my vicinity last year by damming a small brook, making a lake nearly a mile long and fifty feet deep at the deepest point. Part of the valley which was covered by the water was occupied by a thicket of willows. These were left standing with the belief that they would soon rot away and disappear, and were covered so that their topmost branches were five or six feet below

the surface of the water. During the past summer the lake was drained to allow repairs upon the dam. The willows had at this time been under water for seventeen months without once being exposed to the air. At the end of the first week they were distinctly green with a new growth of leaves, and in less than two weeks were in full leaf. Apparently, but for the filling of the pond a second time, they would have continued their growth from the point * at which they had been interrupted nearly a year and a half before, and would have been little the worse for the experience.

HENRY C. BEARDSLEE

ASHEVILLE SCHOOL,
ASHEVILLE, N. C.

SOME CROCUSES GROWN IN A NEW YORK ROOM. — Temperature variable; daytime about 70° F.; night almost that of outdoors. Soil loam and sand. Planted October 31, 1908. Twelve bulbs — nine unnamed and three of the Sir Walter Scott variety. They were planted in an unglazed clay pot 8″ in diameter, 3″ deep and placed under a desk in the coolest part of the room. In about five weeks they were set in a south window which received direct sunlight for about five hours of the day. For several weeks the leaves of the nine unnamed bulbs grew rapidly and the bud sheaths looked promising, then growth ceased and the leaves turned yellow at the tips. The Sir Walter Scott plants showed almost no evidence of growth. So after five or six weeks in the window, the entire dozen were deemed failures and they were banished to their former corner under the desk. There they were neglected, save for an occasional drink. After having been in that subdued light for about four weeks, a bud was discovered on one of the Sir Wafter Scott crocuses. It opened on February 9, 1909, and in a few days was followed by a second blossom. The second Sir Walter Scott began to bloom February 20, 1909, and had three blossoms. The third has at present, March 5, 1909, two thrifty looking buds.

GRACE L. MORRISON

TEACHERS COLLEGE

* The condition of the willows at the time they were submerged — whether in leaf or only in bud — would be of interest. — EDITOR.

New Stations for European Plant Immigrants.—In my field work for the past few months in eastern West Virginia, making extensive economic botanical collections, I repeatedly inquired for any plants from which brooms were made, and was shown a wild specimen of *Cytisus scoparius* (L.) Link, by a native who informed me that it was sometimes used to make "snow" brooms. The plant was growing on an old deforested hillside, one mile east of Pickens, Randolph County, and was 200 yards or more from any path or cultivated field, with no evidence of previous habitations. None of the natives had a common name for this plant, and few had noticed it, except a German, who was acquainted with the plant in Europe. He informed me that it was called "Ginster" in the old country. The range of *Cytisus scoparius* is given as Nova Scotia and the coast region of Massachusetts, Delaware and Virginia, where it is often used as a sand-binder.

Close to the *Cytisus*, I found several specimens of *Ulex europaeus* L. This was called "thistle" by the natives, doubtless on account of its excessively prickly character. The range of *Ulex* is given from southern New York to eastern Virginia near the coast, where it is cultivated as noted under the above species. I have not found these plants elsewhere in the state.

Specimens of both species are preserved in the botanical department of the Field Museum of Natural History.

Huron H. Smith

Field Museum of Natural History,
Chicago, Illinois

PROCEEDINGS OF THE CLUB

February 24, 1909

The Club met at the Museum of the New York Botanical Garden at 3:30 P. M. In the absence of the President and both Vice-Presidents, Mr. Fred J. Seaver was called to the chair. Eight persons were in attendance.

After the reading and approval of the minutes of the meeting for February 9, the following names were presented for membership: Mrs. Pamela Eakin, 38 Oakwood Avenue, Arlington, N. J.,

and Miss Gertrude L. Cannon, 1786 Clay Avenue, New York City.

The announced scientific program was then presented:

"*Collecting Fungi in Jamaica*," by Dr. W. A. Murrill.

This paper has been published in full in the February Journal of the New York Botanical Garden.

"*Cypripedium in the Light of its Segregates*," by Mr. G. V. Nash.

Mr. Nash exhibited living plants and herbarium specimens illustrating the four segregates now recognized by orchidologists, and formerly considered as parts of the genus *Cypripedium*. These segregates are: *Cypripedium*, *Selenipedium*, *Paphiopedilum* and *Phragmipedium*. These divide themselves into two groups. In the first group are *Cypripedium* and *Selenipedium*, characterized by the usually long, leafy stem and broad, flat, thin, many-nerved leaves which are convolute in vernation, and the withering perianth persistent on the ovary. In *Cypripedium* the ovary is 1-celled, and the seeds elongate with a thin testa. This genus is of north temperate distribution, its representatives, about 30 in number, being found in North America, Europe, and Asia.

The other genus of this group, *Selenipedium*, has a 3-celled ovary, and the seeds nearly globose with a crustaceous testa. This is found from Panama to northern South America and is rare. It contains only 3 species, which are seldom seen in cultivation.

The second group is at once recognized by the conduplicate vernation of its long, narrow, fleshy, strap-shaped leaves, and the deciduous perianth. The flowers are borne on scapes, which are rarely somewhat leafy below. To this group belong the remaining two genera, *Paphiopedilum* and *Phragmipedium*. In the former the ovary is 1-celled and the sepals imbricate in the bud. The most evident character, however, differentiating this at once from *Phragmipedium*, is in the lip, which has the margin of the opening straight not infolded. The scape is also commonly 1-flowered, the exception being with more than one. There are some 50 species known in this genus, which is entirely Old World, being generally distributed in tropical Asia and the Malay region.

The genus *Phragmipedium* is entirely New World, occurring

in northern South America and Panama. It contains in the neighborhood of a dozen species, and is at once separated from *Paphiopedilum* by the character of the lip in which the margin of the opening is marked by a broad infolded portion. In addition to this the ovary is 3-celled and the sepals valvate in the bud; the scape, moreover, bears several, sometimes many, flowers.

We have then in the New World three of the genera, two, *Phragmipedium* and *Selenipedium* not known elsewhere, and *Cypripedium* which it shares in distribution with the Old World. The only strictly Old World genus is *Paphiopedilum*.

The meeting adjourned at 4:30 P. M.

PERCY WILSON,
Secretary

OF INTEREST TO TEACHERS

COLLEGE ENTRANCE BOTANY (CONCLUDED)

SPECIFICATIONS OF THE TOPICS TO BE STUDIED

Part I. The General Principles of (A) Anatomy and Morphology, (B) Physiology and Ecology

A. ANATOMY AND MORPHOLOGY.

The Seed. Four types (dicotyledon without and with endosperm, a monocotyledon and a gymnosperm); structure and homologous parts. Food supply; experimental determination of its nature and value. Phenomena of germination and growth of embryo into a seedling (including bursting from the seed, assumption of position and unfolding of parts).

The Shoot. Gross anatomy of a typical shoot; including the relationships of position of leaf, stem (and root), the arrangement of leaves and buds on the stem, and deviations (through light adjustment, etc.) from symmetry. Buds, and the mode of origin of new leaf and stem; winter buds in particular. Specialized and metamorphosed shoots (stems and leaves). General structure and distribution of the leading tissues of the shoot; annual growth; shedding of bark and leaves.

The Root. Gross anatomy of a typical root; position and origin of secondary roots; hair-zone, cap and growing-point.

Specialized and metamorphosed roots. General structure and distribution of the leading tissues of the root.

The Flower. Structure of a typical flower, especially of ovule and pollen; functions of the parts. Comparative morphological study of four or more different marked types, with the construction of transverse and longitudinal diagrams.

The Fruit. Structure of a typical fruit. Comparative morphological study of four or more marked types with diagrams.

This comparative morphological study of flowers and fruits may advantageously be postponed to the end of II, and then taken up in connection with the classification of the Angiosperms.

The Cell. Cytoplasm, nucleus, sap-cavity, wall.

As to the study of the cell, it is by no means to be postponed for consideration by itself after the other topics, as its position in the above outline may seem to imply, but it is to be brought in earlier, along with the study of the shoot or root, and continued from topic to topic. Although enough study of the individual cell is to be made to give an idea of its structure (a study which may very advantageously be associated with the physiological topics mentioned first under B), the principal microscopical work should consist in the recognition and study of the distribution of the leading tissues.

B. Physiology and Ecology.

Rôle of water in the plant; *absorption* (*osmosis*), *path of transfer*, *transpiration*, *turgidity and its mechanical value*, *plasmolysis*.

Photosynthesis; *Dependence of starch formation upon chlorophyl, light, and carbon dioxide; evolution of oxygen*, observation of starch grains.

Respiration; *need of oxygen in growth*, *evolution of carbon dioxide*.

Digestion; *Digestion of starch with diastase*, and its rôle in translocation of foods.

Irritability; *Geotropism*, *heliotropism* and *hydrotropism*.

Growth; *localization in higher plants; amount in elongating stems; relationships to temperature*.

Fertilization; sexual and vegetative reproduction.

Although for convenience of reference, the physiological topics are here grouped together, they should by no means be studied by themselves and apart from anatomy and morphology. On the contrary, they should be taken up along with the study of the structures in which the processes occur, and which they help to explain; thus — photosynthesis should be studied with the leaf, as should also transpiration, while digestion may best come with germination, osmotic absorption with the root, and so on. The student should either try, or at least aid in trying, experiments to demonstrate the fundamental processes indicated above in italics.

Modifications (metamorphoses) of parts for special functions.

Dissemination. Cross-pollination.

Light relations of green tissues; leaf mosaics.

Special habitats; Mesophytes, Hydrophytes, Halophytes, Xerophytes; Climbers, Epiphytes, Parasites (and Saphrophytes), Insectivora.

The topics in ecology (particularly the first four and in part the fifth), like those in physiology, are to be studied not by themselves, but along with the structures with which they are most closely associated, as cross-pollination with the flower, dissemination with the seed, etc. The fifth may most advantageously be studied in G in Part II.

In this connection field-work is of great importance, and, for some topics, is indispensable, though much may be done also with potted plants in green-houses, photographs, and museum specimens. It is strongly recommended that some systematic field-work be considered as an integral part of the course, coördinate in definiteness and value as far as it goes with the laboratory work. The temptations to haziness and guessing in ecology must be combated.

Part II. The Natural History of the Plant Groups, and Classification

A comprehensive summary of the great natural groups of plants, based upon the thorough study of the structure, reproduction and adaptations to habitat of one or two types from each

group, supplemented and extended by more rapid study of other forms in those groups. Where living material is wanting for the latter, preserved material and even good pictures may be used, and a standard text-book should be thoroughly read. The general homologies from group to group should be understood, though it is not expected that these will be known in detail.

In general, in this part of the course, it is recommended that much less attention be given to the lower and inconspicuous groups, and progressively to the higher and conspicuous forms.

Following is a list of recommended types from which, or their equivalents, selection may be made:

A. Algae. *Pleurococcus*. *Sphaerella*, *Spirogyra*, *Vaucheria*, *Fucus*, *Nemalion* (or *Polysiphonia* or *Coleochaete*).

B. Fungi. Bacteria, *Rhizopus*, or *Mucor*, Yeast, *Puccinia* (or a powdery mildew), Corn Smut, Mushroom.

Bacteria and yeast have obvious disadvantages in such a course, but their great economic prominence may justify their introduction.

C. Lichens. *Physcia* (or *Parmelia*, or *Usnea*.

D. Bryophytes. In Hepaticae, *Radula* (or *Porella* or *Marchantia*). In Musci, *Mnium* (or *Polytrichum* or *Funaria*).

E. Pteridophytes. In Filicineae, *Aspidium* or equivalent, including, of course, the prothallus.

In Equisetineae, *Equisetum*.

In Lycopodineae, *Lycopodium* and *Selaginella* (or *Isoetes*).

F. Gymmosperms. *Pinus* or equivalent.

G. Angiosperms. A monocotyledon and a dictoyledon, to be studied with reference to the homologies of their parts with those in the above groups; together with representative plants of the leading subdivisions and principal families of Angiosperms.

Classification should include a study of the primary subdivisions of the above groups, based on the comparison of the types with other living (preferably) or preserved material. The principal subdivisions of the Angiosperms, grouped on the Engler and Prantl system, should be understood.

The ability to use manuals for the determination of the species of flowering plants is not considered essential in this course,

though it is most desirable. It should not be introduced to the exclusion of any part of the course, but should be made voluntary work for those showing a taste for it. It should not be limited to learning names of plants, but should be made a study in the plan of classification as well.

The preparation of an herbarium is not required nor recommended except as voluntary work for those with a taste for collecting. If made, it should not represent so much a simple accumulation of species as some distinct idea of plant associations, or of morphology, or of representation of the groups, etc.

The recent report of Gifford Pinchot, chief forester of the United States, shows that about 700,000 trees were planted last year on forests in Nebraska, Kansas, Colorado, New Mexico, Arizona, Utah, Idaho, and California. There are now growing at the planting stations more than 2,200,000 trees, which will be ready for planting in 1909. Sufficient seed was sown in the spring of 1908 to produce 4,600,000 seedlings.

For the *Bulletin of the New York Botanical Garden* issued February, 1909, Addison Brown has written an interesting account of the Elgin Botanical Garden, created by Dr. David Hosack, and its relation to Columbia College. The *Bulletin* also contains a paper on the North American Gill Fungi with a simple key that will be very helpful to many readers of TORREYA. Each of the above contributions is also issued separately by the New York Botanical Garden.

At the first annual conference of the governors of New England one session was devoted to the planting of trees. Forest trees were discussed, but especial interest was shown in orchard trees. New England, with its convenient markets, low land prices, and large proportion of hilly country not well suited to farming, could easily rank first in the production of apples, if the business were conducted with the energy characterizing western agricultural enterprises and guided by up-to-date methods.

Mycologia, the new journal issued from the New York Botanical Garden, contains the following on the chestnut canker which Dr. Murrill has earlier described for TORREYA: It is well known that practically all of the chestnut trees in and about New York City have been killed within the past few years by the chestnut canker, *Diaporthe parasitica*; but the number of trees destroyed has been only very roughly estimated. Through the efforts, however, of Mr. J. J. Levison, arboriculturist of the parks of Brooklyn, who has made a careful survey of Forest Park, it is now known that 16,695 chestnut trees were killed in the 350 acres of woodland in this park alone. Of this number, about 9,000 were between eight and twelve inches in diameter, and the remaining 7,000 or more were of larger size.

A report has been made by the Commission which was appointed by the Association of American Agricultural Colleges and Experiment Stations in 1906, to consider various matters relating to the expenditure of public funds. The members of the commission are David Starr Jordan, Stanford University, chairman; Whitman Howard Jordan, of Geneva, New York, secretary; Henry Prentiss Armsby, State College, Pennsylvania; Gifford Pinchot, Washington, D. C., and Carroll Davidson Wright, Clark College, Massachusetts. Among other recommendations are the following:

1. Every effort should be made to promote the training of competent investigators in agriculture both in the agricultural, and, so far as practicable, in the non-agricultural, colleges and universities, and their training should be as broad and severe as for any other field of research.

2. The progress of agricultural knowledge now demands that agricultural research agencies shall deal as largely as possible with fundamental problems, confining attention to such as can be adequately studied with the means available.

3. The work of research in agriculture should be differentiated as fully as practicable, both in the form of organization and in the relations of the individual investigator, from executive work, routine teaching, promotion and propaganda, and should be under the immediate direction of an executive trained in the methods of science who should not be hampered by other duties of an entirely unlike character.

4. An advisory board is suggested consisting of members appointed by the Secretary of Agriculture and by the Association of American Agricultural Colleges and Experiment Stations, respectively, which shall confer with the Secretary of Agriculture regarding the mutual interests of the department and the stations and shall consider the promotion of agricultural investigation in general.

NEWS ITEMS

Edward Valentine Hallock, president of the Society of American Florists, died March 3, 1909, at his Long Island home

The University of Michigan has recently received a gift of ninety acres of land to be used as a botanical garden and arboretum.

In the departments of biology, L. L. Woodruff, of Yale, has been promoted to assistant professor, and R. W. Hall, of Lehigh, to full professor.

Mr. Patrick H. Lawlor, a well-known arboriculturist died recently at Flushing, Long Island. Many of our rare shade trees were first imported by Mr. Lawlor.

M. Louis Mangin has been made a member of the Paris Academy of Sciences, in the section of botany, succeeding M. Van Tieghem, who has been elected permanent secretary.

The new chief of the Bureau of General Statistics and Agricultural Information in the International Institute at Rome is Dr. C. C. Clark, of the United States Department of Agriculture.

Further coöperation is planned between the government and the University of Wisconsin. This will include the cultivation of medicinal plants including related investigation and research work.

Since Dr. George H. Shull's return from Europe, where he was studying scientific and economic plant breeding, he has gone to California to resume his work on Mr. Burbank's methods and results.

As the result of the North American Conference on the Conservation of Natural Resources, held in Washington last week, all nations are to be asked to send delegates to an international conference on conservation, to be held at The Hague.

The fifth summer school session of the University of Washington, opens June 22, at Friday Harbor, Washington. Courses are offered in elementary and in field botany. The tuition fee is but $13, making the entire charges for board, etc., for the six weeks only $45.

The Station for Research at Agar's Island, Bermuda, will be open for about seven weeks this summer. There are accommo-

dations for a limited number of instructors or research students in either zoölogy or botany. Members of the expedition may leave New York on one of the steamers of the Quebec Steamship Company's Line, either the middle of June, or, if more convenient, about the first of July. For further information address Professor E. L. Mark, 109 Irving Street, Cambridge, Mass.

The next annual session of the Biological Laboratory of the Brooklyn Institute of Arts and Sciences located at Cold Spring Harbor will be held during the months of July and August, 1909. The regular class work will begin on July 7, and continue for six weeks. The Laboratory offers courses in zoölogy and botany, and facilities are promised to independent investigators; excursions and evening lectures form additional features of interest. The laboratory fee is $30; board will be furnished students for $5 a week. For further information address Dr. Charles Davenport, Cold Spring Harbor, Long Island, New York.

The following illustrated lectures will be delivered in the lecture hall of the museum building at the New York Botanical Garden, Bronx Park, New York City, on Saturday afternoons, at 4:00 o'clock:

April 24. "A Winter in Jamaica", by Dr. William A. Murrill.

May 1. "Spring Flowers", by Dr. Nathaniel L. Britton.

May 8. "How Plants Grow", by Dr. Herbert M. Richards.

May 15. "Evergreens: How to Know and Cultivate Them", by Mr. George V. Nash.

May 22. "Collecting Seaweeds in Tropical Waters", by Dr. Marshall A. Howe.

May 29. "Vanilla and Its Substitutes", by Dr. Henry H. Rusby.

June 5. "The Selection and Care of Shade Trees", by Dr. William A. Murrill.

June 12. "The Ice Age and Its Influence on the Vegetation of the World", by Dr. Arthur Hollick.

June 19. "Haïti, the Negro Republic, as seen by a Botanist", by Mr. George V. Nash.

June 26. "Some American Botanists of Former Days", by Dr. John H. Barnhart.

July 3. "An Expedition up the Peribonca River, Canada", by Dr. Carlton C. Curtis.

July 10. "Collecting Experiences in the West Indies", by Dr. Nathaniel L. Britton.

They will close in time for auditors to take the 5:34 train from the Botanical Garden Station, arriving at Grand Central Station at 6:04 P. M.

TORREYA

May, 1909

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REPRODUCTION BY BUDDING IN DROSERA *

In August, 1907, young plants were found growing from old leaves of *Drosera rotundifolia* (Fig. 1) in the propagating houses of the New York Botanical Garden. At first they were thought to be seedlings but further observation showed that they had no cotyledons, no nepionic leaves like those of seedlings, no roots with one exception (Fig. 5), while they bore glandular foliage leaves like those of the adult plant except in size. Hence it was evident that the young plants were produced from the budding of the old tissue. In some cases the leaves upon which they grew were green and apparently normal; in others, brown and decaying.

Microtome sections through the point of connection between the young plant and the parent tissue (Figs. 2 and 3) showed no union between the vascular tissue of the parent plant and that of the young plant. A differential stain (Haidenhain's iron haematoxylin) showed the difference between the vigorous tissue of the young plant and the disintegrating tissue of the parent plant very clearly, but Delafield's haematoxylin showed no such distinction.

In each case, the stem of the young plant gave rise to five or six leaves before the root appeared as a lateral outgrowth. The root had a red apex and was diageotropic until it had passed beyond the margin of the old leaf, when it bent downward into the sphagnum in which the original plants were growing. In one case only (Fig. 5) was a root observed on the under (non-glandular) surface of the leaf. Later, leaf-petioles and one flower-stalk (Fig. 6) that had accidentally been broken from a plant were found to be proliferating in a similar way.

This growth from an inflorescence is noteworthy because so

* Illustrated with the aid of the Catherine McManes fund.

[No. 4, Vol. 9, of TORREYA, comprising pages 65–88, was issued April 8, 1909.]

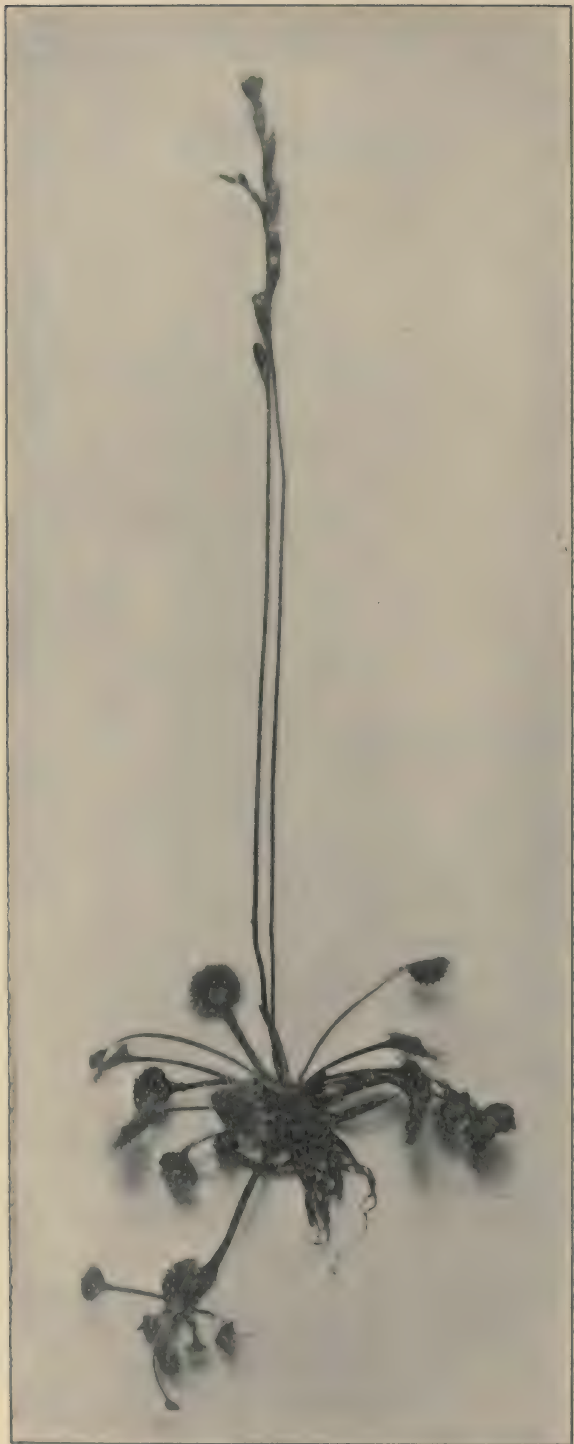
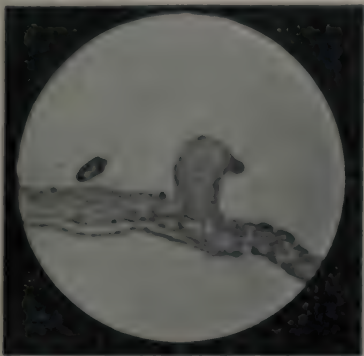


FIG. 1. *Drosera rotundifolia*, showing a young plant growing from leaf.

few examples have been reported (Kupfer, Mem. Torr. Bot. Club **12**: 224. 1907; Robinson, Plt. World **8**: 131. 1905). Plan-



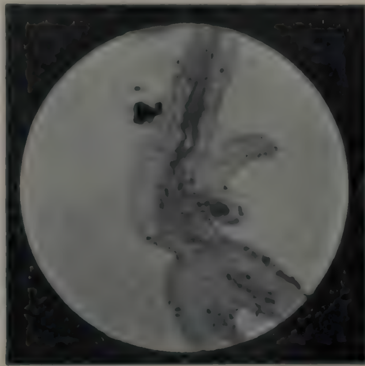


FIG. 2. Photomicrograph of section through an old leaf in region from which young plant is developing.

FIG. 3. Photomicrograph of section through a leaf petiole which bears a well differentiated plantlet. There is no connection between either of the vascular bundles of the petiole and the vascular tissue of the young plant.

chon (Ann. Sci. Nat. III. **9**: 84. *pls. 5 and 6.* 1848) described and figured flowers of *Drosera intermedia* which had passed into a chloranthic condition. The petals and the valves of the ovary

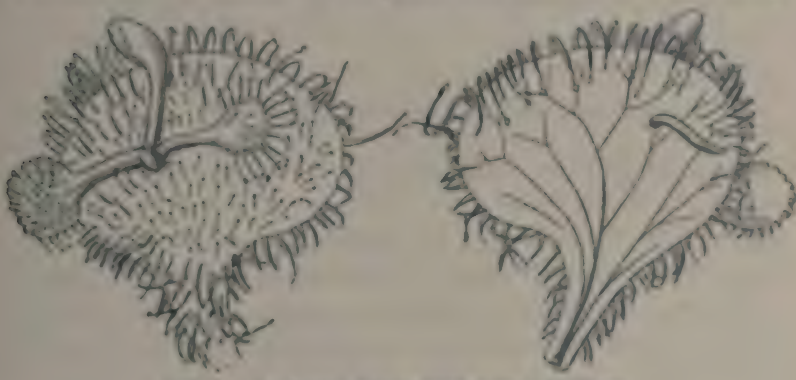


FIG. 4. Leaf upon which young plant is growing.

FIG. 5. Dorsal surface, showing root protruding.

were provided with stipules, bore glands, and were circinate in vernation. Leavitt (Rhodora **7**: 14. 1905) described a similar

aberrant form of *Drosera rotundifolia* but neither observer recorded the development of young plants from the flower-stalks.

To determine whether it was necessary that a leaf should be in connection with the parent plant in order to proliferate, two leaves cut from a mature plant were placed on sphagnum in a moist chamber September 7. One month later a bud was seen upon the surface of one leaf. Three months from the date of beginning

FIG. 6. Flower stalk from which two young plants are growing.

the experiment (Dec. 3) the parent leaf was still green, the leaflets of the young plant were like those of the adult, except in size, and the internodes of the stem were proportionately long, but no root had developed. At the end of four months (Jan. 3) a root was observed which had grown laterally from the base of the stem, while the parent leaf had entirely decayed. This was repeated with four leaves with practically the same results. A portion of a leaf was able to produce a new plant as readily as an entire leaf. Leaves placed with the gland-bearing surface downward in the moist chamber did not produce buds, and all the buds which appeared upon leaves still attached to a plant were upon the upper or ventral side of the leaf.

Nitschke (Bot. Zeit. **18**: 57. 1860) described reproduction by budding in plants of *D. rotundifolia* growing in their native bogs. He observed that while the bud-formation from the leaf surface occurred throughout the summer it was especially frequent in the fall. The buds always developed from the upper side of the leaf. He compared the plant arising from the bud with the seedling and noted that the bud-plant had only a stem root while the seedling had numerous roots at the base. The first leaves of the bud-plant resembled the mature leaves while the seedling had cotyledons each with a single stoma, and nepionic leaves without glandular hairs. Both the bud-plant and the seedling were caulescent during their first year's growth and attained their rosette form at the beginning of the second season, though bud-plants produced in spring in some cases gained the rosette form during the summer. The first leaves made an acute angle with the stem but the angle made by succeeding leaves increased until it became 90° and the rosette form was reached. Drought tended to hasten the production of the rosette form, while fully developed plants placed under moss produced elongated axes like those of their early form.

Grout (Am. Nat. **32**: 114. 1898) noted adventitious buds on the leaves of *D. rotundifolia*, also the occurrence of glandular hairs a short distance from the base of stems of young plants. The latter observation corresponds with a statement made in Nature (**15**: 18. 1876) that plants of *D. rotundifolia* exhibited at the Chester (England) Society of Natural Science showed elongated axes which produced leaves and glandular hairs alternately.

Similar proliferation of the leaf tissues of *D. intermedia* was recorded by Naudin (Ann. Soc. Nat. II. **14**: 14. *pl. 1. f. 6.* 1840). Two plants developed between the mid-vein and margin of the leaf which had rosettes of leaves like those of the mature plant. The lower surface of the budding leaf was perfectly intact and there was no indication of a root.

The appearance of buds upon leaves of *D. longifolia* was reported by Kirschleger (Bull. Soc. de France **2**: 723. 1855).

Winkler (Ber. d. Deutsch. Gesell. **21**: 105. 1903) noted

reproduction in *D. capensis* as arising not from latent embryonic tissue but from ordinary epidermal cells at the apex or near the petiole of the leaf, or upon the petiole itself.

Goebel (Einleit. i. d. exp. Morph. d. Pflanz. 196. *f. 97.* 1908) describes and figures a portion of a leaf of *D. binata*, a species whose leaves fork into two long segments. f a part be cut away and placed in a moist chamber it develops adventitious shoots, which have leaves like those of *D. rotundifolia* instead of being like the parent plant in form. This is the only species so far observed, in which young plants which arise by proliferation from mature tissue, develop leaves different from those of the adult. The question arises as to whether *D. rotundifolia* is not near to the antecedent form in structure while *D. binata* may be the result of the greatest modification, so that it is still in a state of variation and hence reverts to the *D. rotundifolia* type.

An allied form of reproduction which occurs in *D. pygmaea*, a native of southern Australia and New Zealand, is described by Goebel (Flora **98**: 324. 1908). The leaves are arranged in a rosette like those of other species but they are peculiar in having a peltate form and little chlorophyll, the work of assimilation being carried on chiefly by the petioles which are fleshy, contain much chlorophyll, and have stomata. At the close of the vegetative period, in the latter half of October in cultivated plants, numerous brood-bodies which resemble the gemmae of *Marchantia* appear in the center of the rosette. Each is borne upon a slender hyaline stem, the turgid cells at the apex of which set up such a tension that the brood-bodies are easily broken off by the animals which pass over them or by the rain. These small (0.730 mm. by 0.515 mm.), heart-shaped brood-bodies show dorso-ventral differentiation, the under side being smooth while the upper side is rounded into a horse-shoe-shaped cushion. There are stomata on both sides and a vascular bundle runs from the point of attachment to the center of the brood-body. The tissues are rich in starch, fat, and other reserve foods. The anlage of the new plant lies in the hollow at the base and may develop immediately after separation from the parent plant if conditions are favorable, drought being the most serious hindrance. The

first leaves are peltate like those of the adult while the nepionic leaves of the seedling are simpler in form. Goebel believes that the origin of the brood-body is from a leaf anlage which explains their appearing alternately with the foliage-leaves, also the development of a slender vascular strand. It is more difficult to correlate particular parts. At first one is inclined to homologize the blade of the foliage-leaf with the brood-body and the petiole of the foliage-leaf with its stem. However the petiole of the leaf is more strongly developed than the blade, while the stem of the brood-body is less developed. Stipules which appear very early in the formation of the leaf have no homologue in the brood-body. The foliage-leaf is curved so that the apex is directed inwards while the brood-body remains upright. The brood-body develops early from the leaf-anlage and its stem must be regarded as a new structure, the function of which is the dissemination of these reproductive bodies. The part homologous with the foliage-leaf is a group of cells which arises on the inner side of the anlage. No axial buds have been observed in the inflorescence of *D. pygmaea* so it seems reasonable to regard the brood-bodies as new structures which do not arise from axial buds.

From the above observations it is seen that reproduction by budding occurs in *D. rotundifolia*, *D. intermedia*, *D. longifolia*, *D. binata*, and if the brood-bodies of *D. pygmaea* be taken as aborted leaves, the reproduction is by budding in that case also. In each species except *D. binata* the first leaves of the young plant resemble those of the adult. In *D. rotundifolia* at least, the resulting form is the same whether the young plant arises from a leaf still attached to the plant, a leaf cutting, or a flower-stalk removed from the plant.

Whether this is regarded as regeneration or not, depends upon the definition of regeneration which is accepted. Morgan (Regeneration, 23. 1901) says, "The word Regeneration has come to mean in general usage not only the replacement of a lost part but also the development of a new, whole organism, or even a part of an organisn, from a piece of an adult, or of an embryo, or an egg." Goebel (Einleit. i. d. exp. Morph. d. Pflanz. 136. 1908) expresses his idea of regeneration as the phenomenon of

completion or restoration of a plant body after injury without regard to the manner in which it occurs. Pfeffer (Phys. of Plts. trans. by Ewart, **2**: 167. 1903) states that "only those cases ought to be designated as regeneration in higher plants in which the new parts formed after injury or loss exactly resemble in number and position the organs that have been removed." McCallum (Bot. Gaz. **40**: 98. 1905) recognizes three forms of regeneration as follows: "(1) The part removed is entirely restored by the growth of cells immediately below the cut surface; (2) there is no growth of embryonic tissue at the wounded surface, but at a greater or less distance from it the organization of entirely new primordia which develop organs which replace those removed; (3) the organ removed is restored by the development of already existing dormant buds." Dr. Kupfer (Mem. Tor. Bot. Club **12**: 196. 1907) says "The word regeneration ought to be limited to those cases in which an organ is formed, *de novo*, at a place or under conditions in which it would not normally be formed."

In the broadest sense of the term this form of reproduction in *Drosera* may be termed regeneration, but since it may occur on portions of the plant which are still attached to the main axis, without the apparent stimulus of injury, it seems better to place it in the category of plants that reproduce by budding than as an example of regeneration. However it is an illustration of a principle which much of the work on regeneration teaches, that the different forms of reproduction in plants may be arranged in a scale of slight gradations.

Winifred J. Robinson

New York Botanical Garden

JUGLANDACEAE FROM THE PLEISTOCENE OF MARYLAND *

By Edward W. Berry

Some years ago a very complete account of the Pleistocene flora of Maryland was given by Dr. Hollick † who enumerated

* Illustrated with the aid of the Catherine McManes fund.

† Hollick, Maryland Geol. Surv., Pliocene and Pleistocene, 217–237, pl. 67–75. 1906.

about forty species of plants from deposits of this age in that state. Among these there were five members of the family Juglandaceae represented by leaflets of *Juglans*, *Hicoria*, and possibly *Pterocarya* (although the latter is doubtfully determined), and a small poorly preserved nut of *Hicoria*.

Remains of *Hicoria*, both leaflets and nuts, have proved to be very common in such of our Pleistocene deposits south of the terminal moraine as have been exploited. *Juglans*, on the other hand, has thus far proved to be exceedingly rare.

I am indebted to Dr. F. H. Knowlton, of the U. S. National Museum, for the privilege of describing the present exceptionally well preserved specimens which were collected from the Talbot

formation, about one mile south of Chesapeake Beach in Calvert County by William Palmer.

Hicoria glabra (Mill.) Britton.

Several extremely well preserved specimens of the fruit of this species were collected some of which are shown in figs. 1–5. These bring out very well the pear-shaped outline, the indehiscent husk, and the thick shell which characterize the modern

fruits of this species and from which the fossils are indistinguishable. This species has been found fossil at a number of localities. The writer has recorded it from both Virginia * and North Carolina; † Mercer reports numerous specimens from the celebrated cave deposits at Port Kennedy, Pa.; ‡ and the leaflets described by Hollick § from the Maryland Pleistocene as *Hicoria pseudoglabra* may well belong to the same species. This comparative frequency of occurrence in the Pleistocene would seem to indicate that it was exceedingly abundant. Its presence in these deposits can hardly be attributed to more favorable opportunities for preservation since other hickories like *Hicoria minima* and *Hicoria aquatica* inhabit wetter situations and would seem to be equally well situated for interment in river and estuary swamp deposits.

As previously mentioned, the genus *Hicoria* is abundant in the Pleistocene, additional American records being those of *Hicoria pecan*,‖ *Hicoria ovata*,¶ *Hicoria aquatica*, ** and *Hicoria alba*. †† The latter is found in the remarkable Interglacial deposits of the Don Valley near Toronto, Canada, and enables us to form somewhat of an estimate of the time involved in the geological changes of the Quaternary, since with the exception of the occasional carrying and burying of the nuts by squirrels, the normal rate of migration which includes the factors of seed dispersal and rate and time required to grow to bearing age, is comparatively slow in this family.

Juglans nigra Linné.

The single nut of this species which was found is shown in fig. 6. It is identical with the smaller nuts of the modern tree. The husk was entirely rotted away and the surface largely smoothed before entombment, the rugosities of the shell being partially eliminated. It seems probable that the tree which bore

* Berry, Torreya **6**: 89. 1906.

† Berry, Journ. Geology **15**: 340. 1907.

‡ Mercer, Journ. Acad. Nat. Sci., Phila. (II) **11**: 277, 281. 1899.

§ Hollick, loc. cit. 221. *pl. 72. f. 1, 16, 17.*

‖ Lesq., Am. Journ. Sci. **27**: 368. 1859.

¶ Mercer, loc. cit. 279. Berry, Journ. Geology **15**: 340. 1907.

** Berry, Torreya **9**: 71. 1909.

†† Mercer, loc. cit. 281. Penhallow, Trans. Roy. Soc. Can. **10**[4]: 73. 1904; Amer. Nat. **41**: 446. 1907.

the present specimen grew at some distance from its final resting place and that after a period of desiccation it was brought down by some temporarily swollen stream to the estuary where it finally became water-logged and deposited.

Remains of *Juglans* are not abundant in the Pleistocene deposits and so far as I know nuts have not heretofore been described from our American Pleistocene. In Europe the *Juglans tephrodes* Unger of the Pliocene persists in the Lower Pleistocene of the Netherlands: *Juglans regia* Linné is recorded from a number of Pleistocene localities in France, Italy, and Germany; and fruits practically identical with the present species and described as *Juglans nigra* var. *fossilis* by Kinkelin * occur in the Upper Pliocene of Germany. Both genera have a long and interesting geological history, the records of *Juglans* antedating those of *Hicoria* by a considerable interval of time, since the first recorded species of the former are found in strata of Mid-Cretaceous age while the latter has not been found as yet until toward the close of the Upper Cretaceous.

JOHNS HOPKINS UNIVERSITY,
BALTIMORE, MARYLAND

PROCEEDINGS OF THE CLUB

MARCH 9, 1909

The meeting was called to order at the American Museum of Natural History at 8:30 P. M., with Dr. E. B. Southwick in the chair. About fifty persons were present. After the reading and approval of the minutes of the preceding meeting, the resignation of Mr. E. L. Rogers was read and accepted. The Club then listened to a very interesting lecture on "Ferns" by Mr. Ralph C. Benedict. The lecture was illustrated by lantern slides made from photographs taken by the speaker.

The meeting adjourned.

PERCY WILSON,
Secretary

MARCH 31, 1909

The meeting was held at the Museum of the New York Botanical Garden at 3:30 P. M., with Dr. J. H. Barnhart in the chair.

* Kink., Senckenb. Abhandl. 29[1]: 237. *pl. 30. f. 8, 9.* 1908.

Sixteen persons were in attendance. After the reading and approval of the minutes of the preceding meeting, the scientific program was presented. The following abstracts were prepared by the authors:

"Exploration in the Everglades", by Dr. J. K. Small.

"I was accompanied on my recent expedition by Mr. J. J. Carter, of Pleasant Grove, Pennsylvania.

"The principal undertaking of the expedition was the exploration of the group of keys forming the southwestern extension of the everglade reef or chain of islands. This group, extending westward from near Camp Jackson for about ten miles and thence southwestward for about eight miles, dies out in the everglades eighteen miles from Cape Sable. It is popularly known as Long Key, and has furnished the basis of much misunderstanding among the native Floridians and superstition among the Seminole Indians.

"While awaiting the arrival of baggage delayed in transit from the north, we took occasion to visit some of the upper Florida Keys, including the group of Ragged Keys, making notes of observations and complete collections of the plants inhabiting them. Our main object was to determine whether or not Soldier Key and the Ragged Keys really belong to the Florida Keys, from the standpoint of their structure and vegetation. The fact that these islands are members of the Florida Keys was demonstrated in the affirmative by evidence furnished by their coral structure and tropical vegetation. Thus Soldier Key is to be considered the most northern member of the Florida Keys. A glance at a map of that region will also indicate that it is separated from the two islands lying north of it by about five miles of water, including a natural channel. The two islands just referred to, namely, Virginia Key and Key Biscayne, are generally included among the Florida Keys; but a previous study of their structure and vegetation proved them to be merely detached portions of the narrow coastal peninsula, which thus ends at the historic Cape Florida. Soldier Key consists of several acres of partially sand-covered coral-rock with both herbaceous and woody vegetation, the number of species growing there amount-

ing to about five dozen. The Ragged Keys lie about five miles south of Soldier Key and consist of about six islands, the majority of them being larger than Soldier Key.

"The first attempt to reach Long Key was defeated by the high water in the everglades caused by recent rains. While waiting for the water to subside, we visited Key Largo and spent several days exploring the southern portion of that key for a distance of about fifteen miles. We found a considerable original forest about the middle of the key, where four species of cactus were quite common, two spreading opuntias, one spine-armed and one spineless, and two climbing forms, one, a *Cereus*, with three-angled stems, the other, a *Harrisia*, with fluted stems. The leaf-mould in the forest was very deep, in some places covering the coral-rock for a depth of one or two feet, but curiously enough, herbaceous vegetation was almost, if not completely, absent, and places where humus-loving orchids should have grown were barren. In such places the only visible plant not a shrub or tree was the climbing fern, *Phymatodes exiguum*, a tropical American plant known from the United States only on Key Largo. On parts of the key where the forest had been cleared off several plants were found evidently lately introduced from other parts of the tropics.

"The rains having become less frequent and a steady dry southeast wind having set in, Long Key was reached, and a supply-camp established on the eastern end, from which point exploring trips were made to different localities.

"On the most distant island visited we found another tree to add to the arboreous flora of the United States. Returning we crossed portions of the three larger islands which form the backbone of the group, exploring both the pinelands and such hammocks as had not been burned out by recent fires. The flora of the pinelands was both rich and interesting, but that of the small hammocks turned out to be rather disappointing as compared with that of the hammocks twenty miles to the northeast. The larger hammocks certainly contained a more varied flora than the smaller ones, but the fires had been so recent that not a plant could be found in a condition to collect. The second journey was

made along the northern side of the largest key for more than half its length. The everglades seem to be lower on the northern side than on the southern, for we found them submerged, and when the depth of the water prohibited further progress we gradually worked across the key towards the south, and returned to the supply-camp across the higher prairies. A third journey was made along a course close to the southern side of the largest key for eight or nine miles to the west, and then up through the narrow intersecting prairie into the everglades on the north side directly west of the point where we were forced to turn south on the second journey. We then returned to the supply-camp, crossing the largest key through both pinelands and hammocks.

"The last day of the Long Key expedition was devoted to work on Royal Palm Hammock and the two smaller islands adjacent to its western side. Royal Palm Hammock is remarkable fo r thegrowth of palms (*Roystonea regia*), from which it takes its name. These trees are visible across the open everglades almost as far as the eye can reach, and curiously enough this species of palm is confined to this island, with the exception of two plants which grow on the small key which lies near its western side and a very few plants which exist on a key about two miles directly east. Royal Palm Hammock is also noted as being the only locality in the United States where several tropical American epiphytic orchids grow naturally.

"We were surprised to meet with a number of plants, both herbaceous and woody, characteristic of more northern or cooler parts of the country. Among the woody plants the more conspicuous were the laurel-leaved greenbrier (*Smilax laurifolia*), Ward's willow (*Salix longipes*), sweet bay (*Magnolia virginiana*), Virginia creeper (*Parthenocissus quinquefolia*), persimmon (*Diospyros virginiana*), French mulberry (*Callicarpa americana*), and buttonbush (*Cephalanthus occidentalis*). The most interesting of these was the sweet bay, which occurred in diminutive forests, the plants assuming the form of a tree and ranging from one to three feet tall. Their trunks were characteristically buttressed, with a diameter of several inches at the base, tapering to about one half an inch a foot above. The diminutive trees bore both flowers and fruit.

"Our last field work was done on the Vaccas Keys, Crawl Keys, and Grassy Key. We secured a good collection of the plants inhabiting these islands, including some additions to our flora, and a view of the remarkably dense growth of the palm, *Thrinax floridana*, which is well worth a trip there to see."

"Notes on North American Pondweeds", by Mr. Norman Taylor.

"A short historical review of previous treatments of the genus *Potamogeton* shows that Morong (1893) credited 37 species to North America, while Pflanzenreich (1907) lists 42 species and scores of varieties. The forthcoming part of the North American Flora will contain descriptions of only 36 species. A decidedly conservative tendency in the conception of specific limitations accounts for the difference in the number of species, and this is based on a more or less fixed adherence to the principle that in *Potamogeton* fruit characters are the only ones of any real stability.

"The usual characters that have been used by monographers and their relative value for taxonomic purposes, was discussed. As an example of the variability of the group, a series of specimens showing every gradation between the lanceolate leaves of *P. Richardsonii* and the orbicular ones of *P. bupleuroides* was shown, and the contention was advanced that in all probability the three species *P. Richardsonii*, *P. perfoliatus*, and *P. bupleuroides* were in reality one aggregate species with trifling differences."

Discussion followed by Dr. Barnhart, Dr. Rydberg, and the speaker.

The meeting adjourned at 4:30 P. M.

PERCY WILSON,
Secretary

REVIEWS

Ward's Trees*

The little book, which follows the three volumes on Buds and Twigs, Leaves, and Inflorescences and Flowers, is of course designed primarily for use in England; yet, it will prove helpful in

* Ward, H. Marshall. Trees: A Handbook of Forest Botany for the Woodlands and the Laboratory. Vol. IV. Fruits. Pp. 154. *f.* 147. 1908. Cambridge, University Press (Putnam's, New York).

this country, especially to the teacher of general botany. The key is simple, and despite its broken character, owing to the interpolation of many illustrations, can be used easily by any one really interested in trees; it is based upon the fruits as the sub-title indicates. The list of trees included, does not, of course, agree with similar lists of American trees; this is noticeably true of the oaks (5 species) and the maples (3 species). The greatest value to Americans is in the general chapters on fruits (pp. 3–55) in which the distinctions between seed and fruit, and between the various kinds of fruits, is told in a very readable way. The illustrations will prove very helpful for general demonstration purposes; one very great advantage over most illustrations is the care with which the seed attachment is shown.

Jean Broadhurst

OF INTEREST TO TEACHERS

Biology in Summer Vacations

In the preliminary report on the high school course in biology prepared by the New Jersey Science Teachers' Association,* suggestions are given for observations during the summer vacation. They are divided into the studies possible at the seaside, on the mountains, in gardens, etc. The questions suggested by Dr. Harper in the July (1908) Torreya may be too difficult for most of the high school pupils, but some of them, at least, can be used. Will not some teacher, who is in touch with his botany or biology classes again in the fall, send us a report of what he has been able to do in this line? We hear much claimed for biology because it is such a vital subject, in close touch with the child's life. *Can* we in one year give the high school pupil enough to interest him in any such problems and can we enable him to carry them out independently during the summer? Or is it mere talk? Will not some of our teachers try it this summer? Reports upon work of this kind would be more convincing than pages on "educational biology" as to what we can rightfully

* Committee: Mr. G. H. Trafton, Passaic, Chairman; Prof. J. Nelson, Rutgers College, and Miss S. Streeter, Jersey City.

claim for biology or botany and also, as to what we must gracefully yield as wholly beyond high school possibilities.

JEAN BROADHURST

Professor C. S. Gager has an illustrated article on some physiological effects of radium rays in the *American Naturalist* for December, 1908.

The March *Bulletin of the Torrey Botanical Club* has a study of winter buds with reference to their growth and leaf content by Emmeline Moore. This interesting article is illustrated with growth curves and many line drawings of bud sections. The same number contains also an article on some aspects of the mycorhiza problem by Benjamin C. Gruenberg.

The *Journal of Biological Chemistry* for December, 1908, contains an article on *Ibervillea Sonerae*, specimens of which are growing in the New York Botanical Garden. The authors, Miss Julia T. Emerson and Mr. William W. Walker, discuss the plant's chemical composition and its toxicity. One swollen stem that has been lying on a board in a museum case since 1902 still sends up yearly shoots bearing leaves and tendrils.

The parasitic fungi of *Aleyrodes citri*, a serious scale pest of the orange groves in Florida and other southern states, have been recently fully described and illustrated by Mr. Howard S. Fawcett, of the Florida Agricultural Experiment Station; the study was made from an economic standpoint, for the "greatest success in the use of fungi to combat insect pests seems to have been attained in Florida, where proper conditions of temperature and moisture are present."

The *Botanical Gazette* for January, 1909, has an illustrated article by Robert Greenleaf Leavitt on homoeosis, in which is discussed the translocation of characters, such as abscission from the petiole to the petiolules in the horsechestnut, the subdivision of the pinnae as in the frond as a whole in the Pierson and other

ferns, and several other phases of homoeosis, the complete or partial translocation of foliage characters to the flowers or *vice versa*, and the omission of one of the alternative generations as in some ferns, where the tips of the pinnae may be converted into prothallia bearing archegonia and antheridia.

The *New York Tribune* for February 14 reports that "a buried prehistoric forest on the New Jersey coast, near the Sandy Hook military reservation, has been discovered by army engineers while boring for an additional water supply. When the test pipes were down nearly four hundred feet, through strata of red clay, shale, and white sand, a broad strata of wood was found. At one point the borers reported that they went through twenty feet of wood, which they think was a tree trunk still remaining upright. Investigations are being made in the interest of archaeology. If a forest flourished where the sand dunes are now, it is believed it was covered with sand by the action of the sea until buried."

The Calaveras National Forest, the famous grove which contains about 1,400 giant sequoias over six feet in diameter is described in *Science*, March 19. The grove also includes many very large sugar pines, yellow pines, white firs, and cedars. Most of the larger sequoias have been named for famous generals, statesmen, or for states. The Father of the Forests, now fallen, has a basal diameter of over forty feet. Some of these trees contain as much lumber as fifteen acres of ordinary timberland. The first Calaveras bill was introduced some four years ago; the present bill is one of the last signed by President Roosevelt.

Loco-weed, the cause of extensive losses of live stock in the western United States, has been recently investigated by A. C. Crawford (Bull. 129, U. S. Bureau of Plant Industry). Having proved its toxic powers, which was doubted by some investigators, Mr. Crawford next found that the toxicity remained after boiling and was also easily proven in the ash of the plants under examination. In the experiments with animals it was noticed

that a "close analogy exists between the clinical symptoms and pathological findings in barium poisoning and these resulting from feeding extracts of certain loco plants. Small doses of barium salts may be administered to rabbits without apparent effect, but suddenly acute symptoms set in analogous to what is reported on the range," and finally "barium was found in the ash of many 'loco' plants in amounts sufficient to account for the symptoms."

The author mentions that in other localities the toxic action may be due to substances other than barium, and explains the contradictory results previously obtained as follows:

"Loco plants grown on certain soils are inactive pharmacologically and contain no barium. In drying certain loco plants the barium apparently is rendered insoluble so that it is not extracted by water, but can usually be extracted by digestion with the digestive ferments.

"The barium to be harmful must be in such a form as to be dissolved out by digestion.

"In deciding whether plants are poisonous it is desirable not merely to test the aqueous or alcoholic extract, but also the extracts obtained by digesting these plants with the ferments which occur in the gastro-intestinal tract."

NEWS ITEMS

At Munich Dr. P. Renner has been made curator of the cryptogamic herbarium.

The University of Minnesota has been given over 2,000 acres of land for experimental forestry.

L. Lancelot Burlingame has been advanced to assistant professor of botany at Stanford University.

Columbia University is contemplating establishing a course in forestry, with the degree of forest engineer.

The Smithsonian Institution has recently received from Captain John Donnell Smith a second herbarium consisting of over seven thousand fern sheets.

Professor William Stuart, of the Department of Horticulture,

University of Vermont, has accepted an appointment in the U. S. Department of Agriculture.

Dr. H. Metcalf, who has been traveling in Italy collecting resistant varieties of rice, has resumed his work in this country at the Bureau of Plant Industry.

The biology department of Princeton University has received about ten thousand specimens of mosses and hepatics from Dr. Per Dusen and Dr. Hj. Mäller, of Sweden.

The British Science Association is to meet at Winnipeg, August 25 to September 1. Reduced rates from points east and west, with side trips in Canada, are being offered.

Mr. B. E. Dahlgren, formerly connected with the American Museum of Natural History, New York, is now in Jamaica, making studies for a series of models of representative tropical plants for the Field Museum of Natural History, Chicago.

Dr. M. H. Boyè, a prominent chemist, died in March. Though far from the most important of his discoveries, readers of TORREYA may be most interested in his process of refining cotton seed oil (1845) thus securing the well-known colorless oil instead of the former blackish thick liquid.

The New York Botanical Garden offers from the income of the Caroline and Olivia E. Stokes Fund for the Preservation of Native Plants the following prizes for essays not exceeding 5,000 words: (*1*) $40.00, (*2*) $25.00, (*3*) $15.00. The essays must be typewritten in duplicate and must reach the Garden not later than June 20, 1909.

Professor F. S. Earle reports through *Science* that the Cuban administration has demanded the resignation of the staff of the Cuban Agricultural Station — a repetition of the Cuban football policy followed to satisfy the office seekers. Among the men thus unjustly displaced are the following botanists whom Professor Earle "heartily recommends to any institutions having vacancies" in their lines: Dr. H. Hasselbring, botany; Prof. Wm. T. Horne and Mr. J. S. Houser, vegetable pathology; and Prof. C. F. Austin and Mr. C. F. Kinman, horticulture.

TORREYA

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EXPERIMENTS UPON DROSERA ROTUNDIFOLIA AS TO ITS PROTEIN-DIGESTING POWER

By Winifred J. Robinson

A repetition, with some extensions, of a part of Darwin's exhaustive series of experiments on the digestive power of the leaves of *Drosera rotundifolia* was undertaken with the purpose of ascertaining whether the purer proteins now available would give any different results from those obtained by Darwin with tissue fragments or crude protein materials, solid and liquid. The experiments were carried on at the New York Botanical Garden under the direction of Professor William J. Gies, of the College of Physicians and Surgeons of Columbia University.

The plants used were collected in the bogs near Lakewood, N. J., in July, 1907. They were planted in sphagnum at the propagating house of the New York Botanical Garden, where they were kept continuously except when certain of their number were brought to the laboratory of the garden for a short time for observation.

The proteins used were prepared at the College of Physicians and Surgeons under the direction of Professor Gies with the exception of the nucleoprotein, which was extracted from compressed yeast by Professor Gies's method, in the laboratory of the New York Botanical Garden.

To insure accuracy in the records of the experiments a diagram of the arrangement of the leaves of the plant was made in each case, the point on a leaf where a protein particle was placed being indicated on the diagram by an ink spot. Observations of the plants brought to the laboratory were made at intervals of from ten to thirty minutes during the first half day,

[No. 5, Vol. 9, of Torreya, comprising pages 89–108 was issued April 30, 1909.]

while those allowed to remain in the propagating house were examined daily.

Dry Egg-white *

Particles of dry white of egg were placed upon all the leaves of a plant on October 13, 1907. The tentacles curved slowly but at the end of 24 hours were tightly closed over albumen particles. At the end of three days the albumen had entirely disappeared and was no doubt pretty thoroughly digested.

In the use of such crude products as egg-white, as was the case in practically all of Darwin's *Drosera* experiments, the possible influence of salts and other non-protein compounds in the materials employed, is ignored. In the remaining experiments, accessory substances, such as inorganic salts and extractives, have had no influence, for they were completely eliminated from the protein samples in the course of their preparation.

Acidalbumin

Acidalbumin particles were placed upon all the leaves of a plant on October 13, 1907, but the response was slight, and the albuminate remained at the end of three days.

Alkali Albuminate

Alkali albuminate particles were placed upon the leaves of a third plant, October 13, 1907, with a result similar to that in the case of the acidalbumin.

The results of the foregoing experiments show that egg albumen causes a response of the tentacles and ultimate digestion, while the acidalbumin and alkali albuminate both cause a much less vigorous response. The plants upon which the experiments were tried were just ready to enter the resting stage so it is hardly fair to say that they would not more readily digest the acidalbumin and alkali albuminate if the plants had been in prime condition. It is possible, of course, that the prior separation of saline matters and other impurities from the albuminates, removed an effective digestive stimulus.

* This was the only crude product employed. All others were chemically pure.

Edestin

Particles of crystalline edestin were placed on each leaf of a single plant on October 13, 1907. The response of the plant was very slow, and at the end of 24 hours the edestin granules showed no apparent change. Gradually, however, they were dissolved and at the end of three days had disappeared.

Fibrin

Small shreds of fibrin* were placed upon a leaf August 26, 1907, at 2:30 P. M., the plant being kept in the laboratory under a bell-jar, with tubulure, for observation. At the end of 4 hours the tentacles had curved inward and, after 19 hours had elapsed, the particles had been carried from the margin to the center of the disc. At the end of 67 hours a part of the fibrin remained, with the tentacles still slightly closed over it.

On August 26, 1907, small shreds of fibrin were placed on one leaf of each of three plants, which were left at the propagating house; 24 hours later the tentacles were tightly closed over the fibrin in each case. They remained closed through the second day, when they expanded fully. The fibrin had been partially dissolved. Some of the tentacles on two of these leaves were closed over insects. Fibrin was then placed upon the other tentacles, and these continued to be closed after those which digested the fibrin had expanded again.

In an experiment begun October 13, 1907, shreds of fibrin were placed on all the leaves of one plant; 24 hours later the response was slight but at the end of 3 days the fibrin had dissolved.

The results of these experiments show that fibrin, as pure as it can be prepared by the best methods, is dissolved and digested when placed upon leaves of *Drosera rotundifolia*.

Tendomucoid

Small particles of tendomucoid were placed upon two leaves of the same plant, September 18, 1907, and soon dissolved, the glistening drop of solution remaining some time upon the leaf.

* Given special care in purification. Ash content was only 0.4 per cent.

On September 23 the experiment was repeated with similar results.

On October 13 the experiment was again repeated. This time the plant was kept in the laboratory under a bell-jar, with tubulure, and the drop of dissolved mucoid disappeared, hence it was inferred that digestion had occurred at the end of three days.

Yeast Nucleoprotein

September 10 particles of yeast nucleoprotein were placed upon a leaf of a plant in the laboratory. The tentacles slowly closed over it and remained closed three days.

On September 11 the experiment was repeated with the difference that the nucleoprotein was moistened with distilled water before it was used. The result was like that of the preceding experiment. The nucleoprotein became dark-colored in each experiment before it disappeared.

From the response of the tentacles and the disappearance of the nucleoprotein it was inferred that digestion had slowly taken place.

Tendocollagen

Fragments of collagen fibers from tendon were placed upon three leaves of one plant. The tentacles bent but did not close tightly. No change in size or appearance of the collagen particles was observed during four days.

The experiment was repeated September 23, upon a young leaf, with a result similar to the above.

September 27 and October 13 the experiment was repeated upon mature leaves, the result in each case being a bending of the tentacles within half an hour with no further change, hence the response may be attributed to contact stimulus rather than to digestion.

Ligament Elastin

Particles of ligament elastin were placed on a leaf of a plant in the laboratory August 26, at 2:30 P. M. Observations were made at intervals of half an hour during the first four hours, but no response was noted. Daily observations showed no response

at the end of a week. On the same day elastin was placed on several leaves of each of two plants in the propagating house. No change was noted in three days.

On September 3 nine leaves of a single plant in the propagating house were washed with distilled water, after which particles of elastin which had been moistened with distilled water were placed upon them. No movement of the tentacles was observed during six days. On the same day particles of elastin which had been moistened with dilute Liebig's meat extract were placed upon two leaves of a plant in the propagating house. Observations were made on three successive days, but no change was seen. (Note the negative results with creatin recorded in the next section of this paper.)

On September 4 particles of elastin moistened with distilled water were placed upon eleven leaves of a plant in the laboratory; three hours later a slight bending of the tentacles was noted. The following morning all the tentacles had recovered, without effect on the elastin. On the same day particles of dry elastin were placed upon nine leaves of a single plant in the laboratory. After three hours a slight bending of the tentacles nearest the elastin was noted, but, after an interval of twenty hours, all the tentacles had recovered. There was no effect on the elastin.

On October 13 the experiment was repeated in the laboratory with similar results.

Elastin, then, is not digested by the leaves of these plants.

Creatin

Creatin particles were placed upon three leaves of one plant, September 18, in the propagating house. They dissolved but caused no bending of the tentacles. The drops of fluid were present on the leaves for five days, but had disappeared entirely by the ninth day.

On September 23, the experiment was repeated upon one leaf of each of four plants. The creatin dissolved within an hour and a beadlike drop remained for three days on each tentacle upon which the creatin had fallen. No bending of tentacles nor other response occurred.

In Darwin's experiments with meat, creatin (and presumably the other nitrogenous extractives of meat) had seemingly no influence.

General Conclusions

The results of these experiments indicate the ready digestibility of dry egg-white, fibrin, tendomucoid, and nucleoprotein. Acid-albumin, alkali albuminate, and edestin were digested, but somewhat less readily than the products first named. Collagen and elastin appeared to be entirely indigestible. Even when moistened with meat extract the elastin particles failed to undergo digestive alteration. Creatin did not cause bending of the tentacles.

These observations cannot be directly compared with Darwin's because Darwin dealt with mixtures or crude products.

The proteolytic enzymes of *Drosera* are, like those of other organisms, able to digest some proteins and unable to digest others.

New York Botanical Garden

SPECIES OF GYMNOSPORANGIUM IN SOUTHERN ALABAMA

By R. E. Stone

While connected with the Alabama Agricultural Experiment Station I became interested in the distribution of certain fungi, especially species of *Gymnosporangium*. The presence of several species of cedar as well as many species of the Pomaceae would indicate that many species of the genus *Gymnosporangium* might be found.

Up to the present time the species reported for Alabama are: *Gymnosporangium macropus* Link, *G. globosum* Farl., *G. Clavipes* C. & P., *G. flaviforme* Atk., and *G. Nidus-avis* Thax. All of these are reported as occurring on *Sabina virginiana* (L.) Antoine.

The presence of *Chamaecyparis thyoides* (L.) B.S.P. and also of *Amelanchier canadensis* (L.) Medic. and *Aronia* (L.) Ell. lead me to believe that *Gymnosporangium biseptatum* Ellis or *Gymno-*

sporangium Ellisii Berk. might be found. Also the presence of *Sabina barbadense* (L.) Small would indicate that *Gymnosporangium bermudianum* Earle might be collected in the state.

For this reason I made a collecting trip into southern Alabama early in March, 1908, for the purpose of gathering material. In order to become acquainted with *Gymnosporangium bermudianum* as it occurs on its host, *Sabina barbadense*, I went first to Biloxi, Miss., the type locality for this species.

While on the trip I discovered some new combinations.

New Hosts

Gymnosporangium macropus Link, on *Sabina barbadense* (L.) Small (new host).

Collections were made at Biloxi, Miss., March 3, 1908; Coden, Ala., March 6, 1908; Bayou Labatre, Ala., March 8, 1908.

At Biloxi, Miss., the *Gymnosporangium macropus* and *Gymnosporangium bermudianum* were found growing on the same tree.

Gymnosporangium globosum Farl., on *Sabina barbadense* (L.) Small (new host).

Collections were made at Biloxi, Miss., March 3, 1908, and Bayou Labatre, Ala., March 6, 1908.

On this trip the gap in the known distribution of *Gymnosporangium bermudianum* was partly filled out by collections made at Bayou Labatre, Ala., March 6, 1908, and at Spring Hill, Ala., March 8. The collections of this species are complete enough now to enable us to say that it occurs all along the Gulf Coast from Florida to Louisiana. The species probably extends west to Texas and perhaps farther.

Perhaps the most important collections, as far as extending the known range of certain species is concerned, were those of the two species of *Gymnosporangium* found on the white cedar, *Chamaecyparis thyoides* (L.) B.S.P. As stated previously, the presence of the white cedar and both *Amelanchier canadensis* and *Aronia arbutifolia* gave the requisite conditions for either one or both of the two species to be found. However since neither had been collected in the south my hope of finding them was small indeed.

On March 8, 1908, while collecting in a swamp between Mobile, Ala., and Spring Hill, a suburb of that place, I secured some very fine specimens of *Gymnosporangium Ellisii* Berk., on *Chamaecyparis thyoides* (L.) B.S.P. The same day I secured at Spring Hill a very good specimen of *Gymnosporangium biseptatum* Ellis, on the same host. As I was in a hurry at the time, in order to get out of a storm, I did not fully appreciate the find until I had returned to my laboratory at Auburn, Ala. I have not had another opportunity to secure more of this material.

Now neither of these species has been collected farther south than New Jersey. It would seem improbable that such a wide gap as this, from New Jersey to Alabama, would occur in the distribution of either of these species, especially when the white cedar occurs all along the coast between these points and the alternate host plants are usually found in the same localities, at least the range given in the various manuals would seem to show this. It is probable that both of these species, *G. biseptatum* and *G. Ellisii* occur all along the whole coast from Maine to Texas. Careful search, I am sure, would fill in the gap in the known distribution if not extending it.

Summing up the situation for Alabama we can report the following species of *Gymnosporangium.*

Gymnosporangium macropus Link on *Sabina virginiana* (L.) Antoine. *Sabina barbadense* (L.) Small (new host).

Gymnosporangium globosum Farl. on *Sabina virginiana* (L.) Antoine. *Sabina barbadense* (L.) Small (new host).

Gymnosporangium flaviforme Atk. on *Sabina virginiana* (L.) Antoine.

Gymnosporangium Clavipes C. & P. on *Sabina virginiana.* (L.) Antoine.

Gymnosporangium Nidus-avis Thax. on *Sabina virginiana* (L.) Antoine.

Gymnosporangium bermudianum Earle on *Sabina barbadense* (L.) Small.

Gymnosporangium biseptatum Ellis on *Chamaecyparis thyoides* (L.) B.S.P.

Gymnosporangium Ellisii Berk. on *Chamaecyparis thyoides* (L.) B.S.P.

Specimens of *G. globosum* and *G. macropus* on *Sabina barbadense* as well as specimens of *G. biseptatum* and *G. Ellisii* have been deposited in the following herbaria: Prof. A. B. Seymour, Cambridge, Mass.; Dr. J. C. Arthur, Purdue University, Lafayette, Ind.; Prof. S. M. Tracy, Biloxi, Miss.; Prof F. E. Lloyd, Alabama Polytechnic Institute, Auburn, Ala.; Dr. E. M. Wilcox, Pathology Herbarium, University of Nebraska, Lincoln, Nebr.

I still have a few good specimens of *G. Ellisii* in my own collection.

I am still greatly interested in securing specimens of both *G. biseptatum* and *G. Ellisii*, especially from the region between New Jersey and Alabama and west to Texas, and any information of such collections would be greatly appreciated.

UNIVERSITY OF NEBRASKA,
LINCOLN, NEBRASKA

FOSSIL EUPHORBIACEAE, WITH A NOTE ON SAURURACEAE*

BY T. D. A. COCKERELL

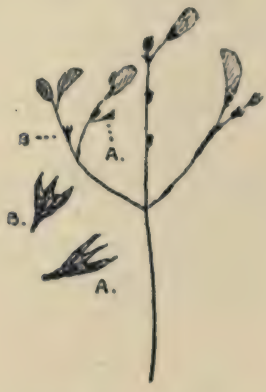
Up to the present time, no Euphorbiaceae have been described from the American Tertiaries, although from their present abundance and wide distribution there can be no doubt that they have long existed on this continent. Most of the plant-bearing strata are very poor in herbaceous forms, but Florissant is more fortunate in this respect, and has already yielded us a number of low-growing genera not elsewhere known fossil. Among the recently gathered materials I have been glad to find a couple of species which appear to be certainly Euphorbiaceous.

Acalypha myricina sp. nov.

Leaf lanceolate, the blade about 22 mm. long and 8 broad, on a short curved petiole; general form very much as in *A. gracilens* Gray; surface densely glandular-pitted; margin with very short blunt dark-colored gland-teeth; three prominent nervures, running nearly parallel. The figure shows the details better than they can be described.

* Illustrated with the aid of the Catherine McManes fund.

The reference to *Acalypha* seems safe; but there is a possibility that the plant may be a *Croton* of the type of *C. tiglium* L. In *Croton tiglium* the shape, margin, and venation are all different from those of the fossil, and I do not know of any *Croton* which matches it better.



Croton furcatulum Ckll.
A, *B*, calyces (enlarged).

Acalypha myricina Ckll.

Hab.— Miocene shales at Florissant, Colorado, Station 13 B (*W. P. Cockerell*, 1908). It occurs on a slab with a beautiful branch (bearing thirteen leaves) of *Myrica drymeja* (Lx.) Kn. The *Acalypha* leaf is superficially like that of some species of *Myrica*.

Croton (?) furcatulum sp. nov.

Represented by a slender twig, 15 mm. long, giving rise to three slender branchlets as shown in the figure, these about 11 mm. long. The central branchlet supports small dark sessile objects, which appear to be buds or calyces, at 4.5 and 8 mm. from the base, and terminates in a small calyx, below which arises a long-oval or elliptical leaf (no doubt originally a pair), on a petiole about 3 mm. long; at the base of this leaf is a dark object which may be another calyx. The lateral branchlets fork at a distance of 6 mm. from their origin, giving rise to a pair of branchlets supporting calyces and leaves as shown in the figure. The calyces have long pointed lobes, apparently three in number.

The general appearance of the plant is suggestive of *Euphorbia* (in the old sense), but the calyces are much more like those of *Croton* or *Crotonopsis*. The species of *Croton* differ materially in the arrangement of the flowers, but among the scanty materials at my command I have not found one agreeing with the fossil. Possibly *C. monanthogynus* Michx. is as near to it as anything.

Hab.— Miocene shales of Florissant, Colorado, Station 14 (*S. A. Rohwer*, 1907).

Tithymalus Willistoni sp. nov.

Some time ago I was informed by Dr. Williston that seeds of a plant almost identical with the well-known "Snow-on-the-Mountain" had been found in the Loup Fork Beds of Kansas, but had not been described. Through the kindness of Mr. H. T. Martin, I have been able to examine some of these, taken from the interior of a skull from the Loup Fork at Long Island, Kansas. As preserved they are perfectly white, and as Dr. Williston stated, they almost exactly agree with the seeds of *Tithymalus marginatus* (Pursh) Ckll. The sculpture is practically the same and the only difference I notice is that they are larger and more robust, 4½ to 5 mm. long, and the larger ones 5 mm. in transverse diameter. The suture on one side is very evident. On some of the seeds, the reticulated sculpture has become almost obsolete, but evidently by wearing, as others show it very strongly. This fossil species may be called *Tithymalus Willistoni*.

Fossil Saururaceae?

The Saururaceae constitute a small family allied to the Piperaceae, with three genera. *Saururus* has one species in eastern North America and one in Asia. *Houttuynia* is Asiatic and *Anemiopsis* is represented by a single species living in damp alkaline spots in the western United States. Evidently the group is a waning one, and it might be expected that it would occur more abundantly in the Tertiary strata. It has not been recognized as such in our western Tertiaries, but *Piper Heerii* Lx., an unfigured species from the Eocene at Golden, Colorado, may belong there. According to Lesquereux, *P. Heerii* is exceedingly like *P. antiquum* Heer, a fossil from Sumatra. This *P. antiquum*, in the shape and venation of the leaf, agrees excellently with *Houttuynia*, and probably belongs to that genus.

REVIEWS.

Coulter and Patterson's Practical Nature Study*

The writer once heard from T. C. Mendenhall the story of his first impulses to a scientific career; and that history has always remained with him as instructive and valuable because suggestive of what the elementary school may do for the progress of science. Mendenhall said that when he was a boy in a country school in Ohio, his teacher took pains to perform with her scholars simple experiments in natural philosophy for the purpose of arousing their curiosity, opening their eyes, and stimulating their minds. One of these experiments was to place a coin in the center of a basin, arrange the scholars around in such positions that the coin was concealed from every eye by the rim of the basin, and then to pour in water until, no one having moved in the least, the coin became visible to all. At another time the schoolroom was darkened, light was admitted through a small aperture, so that the camera obscura effect was obtained, and the images of children playing outside were thrown in their natural colors on the opposite wall of the room. These simple exhibitions powerfully stirred young Mendenhall's imagination. The result, as everyone knows, was a career of service in the advancement of science, the conduct of government surveys, and the administration of great educational institutions.

It is highly important that considerable numbers of people form the habit of finding out things for themselves, with respect to the processes of nature. As a custom of the race this is not an old habit, only about three hundred years old; yet its effects are those which most — at least most visibly — distinguish our age from every age that has gone before.

The school may assume a favorable relation to the growth of science considered as human endeavor. Boys and girls may be awakened by the contact with nature which we give them, as Mendenhall was awakened, and thus the numbers of those dealing with nature in an original way to the end of bringing its forces into our employ may be augmented.

*Coulter, John M., Coulter, John G., and Patterson, Alice J. Practical Natuer Study on an Agricultural Basis. A manual for the use of teachers and normal students. Pp. ix + 350. 1909. Appleton & Co., New York. $1.35.

On the contrary it is possible by means of highly organized scientific courses in schools to kill, to a very thorough deadness, interest in natural history and natural philosophy. The writer ventures to express the opinion, long entertained and now, through much inquiry among young men issued from the schools, become a conviction, that the type of school physics course at present in vogue often has this effect. The falling off in the election of physics by college students since the general adoption of an elaborate entrance requirement in physics is well known. As for botany, an experienced college examiner in this subject told the writer that candidates in botany could be grouped into three classes. The first passed with honors: they came from well-equipped schools where the subject was thoroughly *done*. The second group merely passed. The third got in. The college electives in botany, this professor continued, were manned from classes two and three, the most satisfactory students coming from the latter. Boys perfectly "prepared" never afterwards appeared upon the field.

Such considerations as the foregoing, and the possibility of the untoward effect suggested above, would seem to be enough to command attention among scientific leaders to the problem of school science even in the lowest grades. Unhappily there are some who have frowned upon the movement to keep alive in school children the "tentacles of inquiry". Regarding nature study as at best "the efflorescence of the sciences" they have bidden the grade teacher (salaried at $400) come to the university for scientific training. They have neither inquired into conditions in order to organize instruction suited to the exigencies of the case, nor used their superior endowments of knowledge and advantage of prospective in coöperation with schoolmen seeking a betterment. But most happily there are some eminent examples of the leader of science alive to the opportunity for wide service. The activity of these men must eventuate not only in the enrichment and improvement of school curricula, but also, as has just been suggested, in an acceleration of the science process itself. The names of several eminent Americans instantly occur to everyone in this connection.

Lately Professor Coulter of Chicago has appeared as one of the authors of a work aimed directly at the solution of the nature study problem.

The work is styled "practical" and the basis is agricultural. The field is, therefore, that of the rural school, or at least of the schools of communities in which agricultural interests predominate. How far the outlines for school-room use and the specimen studies will apply beyond the limits of this field, cannot be foretold. But there is no doubt, whatever, that the *principles* enunciated are valid for every variety of local condition. The treatment is especially noteworthy and should have wide attention. The reviewer hopes that its influence may be extensive. Could these pages be broadly disseminated among teachers, supervisors, and superintendents the effect for good would be immediate and distinct; and the fog which so often envelops the subject would begin to dispel.

The book is in four parts: the first deals with the mission, the dangers, and the principles of nature study; the second contains a topical outline in nature study and typical lesson plans; the third is devoted to rural school outlines and subject matter for both biological and physical nature study; and in part four are found chapters on bird study, school gardens, general misconceptions, and evolution.

The second part represents the course as given in the Training School of the Illinois State Normal University. Though definite in character and designed to give specific aid to teachers who are called upon to handle the subject with little previous training, yet they are not indicative of any belief on the part of the authors that all nature study material should be so prescribed as to manner of treatment.

The authors think that the time has come for extensive experiment by trained teachers working in the light of certain evident principles. They insist that the teacher has the right to the last word.

The utilitarian trend of present-day education is reflected in the subjects of study from the first to the last grade — food, clothing, shelter, domestic animals, the plants of garden and

lawn, insect friends and enemies of man, thermometers, stoves, pumps, water systems, weather, soils, the selection, cultivation and marketing of corn, etc., etc. Wild nature, however, is not neglected. General principles of life and of inorganic nature are developed in such measure as the grade of advancement will allow. In the eighth grade the study becomes distinctly scientific in form on the side of plant study, for under the word "Botany" appears "observation of the gross anatomy of types of algae, fungi, liverworts, mosses, ferns, conifers, monocots, and dicots."

In the minds of these authors there is no confusion of nature sentiment, nature fancy, and nature study. The relation of literature to nature study, and of nature study to science and to agriculture are sanely and firmly grasped. Nature study is always to share the scientific spirit, in so far as science is a method of problem solving. Sentiment, the love of nature, which belongs of right to all healthy minded people, should be present as an atmosphere. But it alone is not nature study. Neither is nature study diluted botany, zoölogy, physics, etc. Poetry may be an aid; imaginative treatment is often a help when it does not substitute interest in fancy for interest in nature. But above all we must be clear to the fact that *truth itself when clearly discerned is very attractive.*

The intellectual results which the authors believe may be looked for are: A sustained interest in natural objects and the phenomena of nature; independence in observation and inference; some conception of what an exact statement means; some conception of what constitutes proof. Their hopefulness is born of experience with the children themselves. It is surprising and gratifying say they — and the reviewer's experience agrees — to see how rapidly young children learn to hold steadily to what they have seen and to state it without exaggeration or verbiage. "Whole systems of belief and lines of conduct have been constructed upon a basis of claimed fact which a child in the grades, trained in nature study, could he understand the terminology, would reject without hesitation. An injection of such children in large numbers into any metropolitan community would work a revolution."

The actual treatment of nature study materials is, as above stated, largely utilitarian — necessarily so, since nature study in this scheme leads to elementary agriculture — but the authors' ideal outcome for all the training given by the school through this medium is so broad and so fine that at once the whole system is raised above the merely industrial and acquisitive plane. In the light of this ideal, nature study becomes, let us dare to suggest, something better than an "efflorescence of the sciences" — as one eminent man of science phrased it to the present writer. The authors believe firmly in the attainability of this ideal; and with good reason, as experiments in some parts of the middle west are already beginning to demonstrate. Even those who have looked with some contempt upon the nature study movement will probably be able to discern in the following picture the delineation of a condition highly to be desired: "We do not want our country boys," say the authors, "to become merely efficient farmers who have learned to do certain things that they may make more dollars. We want them to be men who realize the larger applications of the laws and principles they are following, men who see and discriminate, who grasp situations, who think for themselves, and who have an abiding interest and enthusiasm for their profession, looking upon their fields, orchards, and meadows somewhat as laboratories in which to work out experiments to the end that they may do their work more profitably and enjoyably. We would have them men who take a keen pleasure not only in making their soil more productive, and in raising better crops and stock, but quite as much in making the home and its surroundings and the life within it more comfortable, more interesting, and more beautiful."

Robert G. Leavitt

New York State Normal School,
Trenton, New Jersey

PROCEEDINGS OF THE CLUB

April 13, 1909

The Club met at the American Museum of Natural History at 8:30 p. m. and was called to order by Mr. Charles Louis

Pollard, who presided in the absence of the president and both vice-presidents. The attendance was twenty-five.

Mr. Norman Taylor, chairman of the field committee, asked that authority be given him to issue a circular letter requesting the members to vote relative to the continuance of the field meetings. The Club voted that this authority be given.

The announced paper of the evening on "Botanizing on the Headwaters of the Saskatchewan and Athabasca Rivers"* was then presented by Mr. Stewardson Brown. The lecture was illustrated by lantern slides.

Adjournment followed.

Percy Wilson,
Secretary

April 28, 1909

The meeting was held at the New York Botanical Garden, with Dr. Tracy E. Hazen in the chair. Sixteen persons were present. The minutes of the meeting of April 13 were read and approved.

Dr. William A. Murrill, chairman of the cryptogamic section of the committee on the local flora, made a report in which the following suggestions were submitted:

(1) The publication of keys and lists of local species for field use; (2) the preparation of a map of the territory included; (3) coöperation with other botanical clubs within or bordering on this territory; (4) coöperation with the field committee in the selection of suitable places for excursions and the care of cryptogamic material collected on these excursions; (5) the use of a given space in Torreya for notes upon and additions to the local flora; (6) a joint meeting at an early date with the phanerogamic section of the committee on local flora.

Mr. Norman Taylor, chairman of the field committee, reported the results of a post-card vote on the continuance of the Club's field meetings as follows:

Non-committal or equivocal (mostly out of town members)	38
For total discontinuance	9
For discontinuance during July and August only	20
For permanent continuance	28
Total number of votes received	95

* Mr. Brown has promised an illustrated paper based upon this lecture for later publication in Torreya.

In view of this showing, it was decided to continue the field meetings through July and August, as usual.

On motion, the Club voted to endorse the application of Miss Winifred J. Robinson for a grant of $200.00 from the Herrman Fund of the New York Academy of Sciences.

The scientific program consisted of a discussion of "The Cactuses of the West Indies" by Dr. N. L. Britton.

The speaker referred to the distribution of cacti in the West Indian Islands and the regions inhabited by them; these are mostly on the southern side of the larger islands, where the rainfall is very low and where these plants are very abundant, certain portions of the southern side of eastern Cuba and of Jamaica being actual cactus deserts. On the smaller islands the cacti grow less abundantly and mainly at low altitudes. The genus *Rhipsalis* forms an exception to the general xerophytic distribution, its species growing on trees and cliffs in relatively moist regions. Southern Florida contains several species similar to some of those growing on the Bahamas and in Cuba or identical with them. After a preliminary description of the plants the meeting adjourned to the propagating houses of the New York Botanical Garden, where specimens of living cacti, including nearly all the known species of the West Indies, were exhibited and described.

PERCY WILSON,
Secretary

FIELD NUMBERS FOR THE TORREY CLUB EXCURSIONS

The chairman of the field committee has started a series of field numbers to be used on the days that the Club holds its excursions. These will run continuously during the entire season. Those members who care to number their collections in accordance with this set of field numbers will have the opportunity to collate specimens thus numbered with notes which will subsequently be published in TORREYA. It is planned to publish all the determinations of special interest, but no attempt can be made to print the determinations of the common and widely dispersed plants.

NORMAN TAYLOR,
Chairman

OF INTEREST TO TEACHERS

College Entrance Botany

In *School Science and Mathematics* for February Mr. Franklin T. Jones, of Cleveland, Ohio, opens anew the discussion of high school work for the college boy and for the boy who is not going to college. Some entrance papers (September, 1908) are given and the question is asked, "In what respects would a teacher do differently in preparing students for these examinations than if he were giving them what he considered best in preparing them for life?" While some claim that the best preparation for life is not accepted by college people as the best preparation for college and that teachers are forced to eliminate the vital part of the various subjects in order to fill college entrance requirements, Mr. Jones pertinently asks: "Are not such assertions more or less preposterous on the face of them? Are we, as teachers, ready to confess that we cannot do pretty much as we please in shaping the details of our courses, and that, with such freedom, we are therefore (if we accept the judgment of some of our highest educational authorities) really making failures of our chosen work? Is not our practice and our theory better than it was even ten years ago, and are we not on the up path rather than the down? It seems . . . that it is about time for us science teachers to champion strongly what we *are* doing, or else as we have almost perfect freedom to do, on our own individual initiative, change to the best thing."

The examination questions given in botany in this particular case are far from indicating a desire to demand preparation along a line that is "far from life".

Entrance Examination in Botany

Columbia College, September, 1908

NOTE. — Time: Two hours, ten minutes of which will be devoted to an oral examination. The certified notebook on the laboratory work must be submitted at the examination.

1. What structures of the leaf are of advantage in photo-synthesis? Explain in what way each one is of service.

2. What is the cause and mechanism of the curvature of tendrils?

3. How is the root protected against injury? How does it absorb materials from the soil? What other functions does it perform?

4. Make a sketch of the important stages in the life of a fern, labeling the various parts.

5. In what respects does the seed of a Monocotyledon usually differ from that of a Dicotyledon?

6. Mention the agencies that promote the distribution of plants, with illustrations of the adaptive features. What factors control the association of plants upon the earth?

7. Give the characteristics of six families of seed plants that you have studied.

Popular Science Monthly for March contains an illustrated article on the influence of radium rays on a few life processes of plants by Professor C. Stuart Gager and a history of botany at St. Louis by Dr. Perley Spaulding.

The April *Popular Science Monthly* is a Darwin number with numerous well-written articles on Darwin, his theories, and his relation to the various sciences; the one dealing directly with botany is by Professor N. L. Britton.

The *Review of Reviews* for April has several illustrated articles of botanical interest: one on soil erosion in the south by W. W. Ashe, a second giving the "truth about dry farming" by C. M. Harger, and a third on saving America's plant food by G. E. Mitchell.

An article on the existence of non-nitrifying soils is to be found in *Science* for March 26. The authors, F. L. Stevens and W. A. Withers, report that 44 per cent. of the samples tested in North Carolina failed to nitrify, thus showing that all soils have not the power to convert organic or ammoniacal nitrogen into nitrate nitrogen, *i. e.*, to nitrify.

Science, for April 16, describes a series of large tanks now being constructed at Cornell University. They are specially de-

signed to help solve the problems related to soil productiveness, such as: effects of the continuous use of large amounts of mineral fertilizers upon the physical and chemical properties of the soil, and upon the bacterial flora and bacterial activity; changes that occur in a series of years when soils gradually deteriorate or improve; effect of different methods of soil treatment upon the loss of lime in the drainage water; loss of potassium and other substances occasioned by manuring with lime; loss of soluble salts caused by clean cultivation; extent to which soils under field conditions are renewed by accession of the lower soil to the plowed surface.

Professor Otis W. Caldwell, of the University of Chicago, has an article on "The Course in Botany" in the January *School Science and Mathematics*. The whole article is well worth reading by all teachers of botany. A suggestive full-year course is suggested for high schools. The principles that, according to Professor Caldwell, should determine the course will be seconded by all. They are: (1) "The materials selected for use in the course should have *appreciable significance* to the students. . . . This appreciable significance may be found in a knowledge of practical use of materials, a general understanding of life problems, appreciation of the aesthetic aspects of plant life, desire for knowledge, or a knowledge of the basis of agriculture or other industrial pursuits. (2) The materials must be of value for general knowledge by the public. There is a general culture value in knowing plant life, and the time has come when knowledge of the activities of plants and the part they perform in modern life is a part of the body of knowledge people must have in order to be properly intelligent as to their environment. (3) The materials of the course should be organized into a series of natural sequences to make possible the development of the problem-solving attitude of mind, and to carry this series long enough really to give some facility and efficiency in thinking."

NEWS ITEMS

The new keeper of the Kiel Botanical Institute and garden is Dr. Ernst Küster, of Halle.

After the Alaska-Yukon-Pacific Exposition (1909) is over, the forestry building is to be given to the University of Washington.

Dr. Charles E. Bessey, dean of the industrial college of the University of Nebraska, has been made head dean of the University.

A biological station is to be established at Devil's Lake, North Dakota, under the charge of Professor M. A. Brannon of the State University.

Mr. J. R. Johnston, of the Bureau of Plant Industry, has recently returned from Cuba, where he has been studying the bud-rot of the cocoanut.

Field classes in the Arnold Arboretum, Boston, are to be conducted this spring by M. J. G. Jack, for those interested in native and foreign trees and shrubs of New England.

The agricultural colleges and experiment stations of Europe are to be visited this summer by Professor F. L. Stevens, of the North Carolina College and Experiment Station.

Among the instructors of the Oklahoma Agricultural College affected by the Board's summary and wholesale dismissal of April, 1908, are Professor O. M. Morris, botany and horticulture, and Professor E. E. Balcomb, agriculture.

McGill University at the opening of McDonald College will confer the degree of LL.D. upon two members of the United States Department of Agriculture: Hon. James Wilson, Secretary, and Mr. Gifford Pinchot, Chief Forester.

The Luther Burbank's Products Company which, according to the March TORREYA, was to distribute Mr. Burbank's new varieties, was not successfully launched. Mr. Burbank will still, fortunately, continue the distribution of his new varieties.

Dr. George T. Moore, formerly connected with the Department of Agriculture, has accepted the newly created professor-

ship of plant physiology and applied botany in the Henry Shaw School of Botany at Washington University at St. Louis.

The Marine Biological Laboratory, situated at Woods Hole, Mass., gives the usual six-week courses beginning June 30. The courses in botany are in morphology and taxonomy; each course requires the full time of the student; the fee is $50. The laboratory is open the entire summer to investigators.

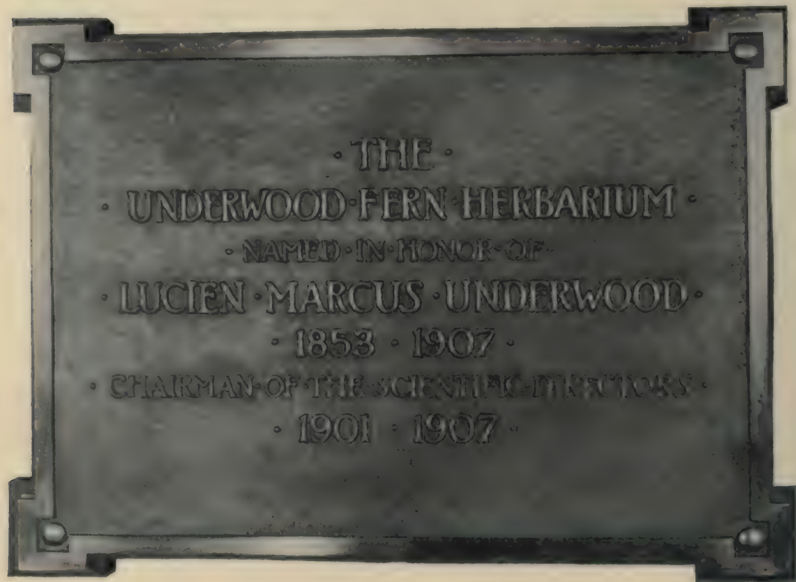
Professor George L. Goodale, of Harvard University, with which institution he has been connected for more than thirty years, will retire this June from active service. Mr. Oakes Ames, for several years actively connected with the Harvard Botanical Garden, has, since the resignation of Professor Goodale, been made director of the Garden.

The George Washington Memorial Association is initiating a movement to erect in Washington a great memorial building in recognition of George Washington's expressed desire to promote institutions for the general diffusion of knowledge. The building "will contain a great hall or auditorium and rooms for large congresses" besides "rooms for small and large meetings, office rooms and students' research rooms."

A James Fletcher memorial fund is being collected by the Ottawa Field-Naturalists' Club. The suggestions as to the form it shall take are a fountain, a statue, and a bust or portrait in appropriate places in Ottawa, and a bursary at some Canadian University. Contributions may be sent to the Secretary-Treasurer of the memorial committee, Mr. Arthur Gibson, Central Experiment Farm, Ottawa.

The University of Colorado is going to establish a summer laboratory for botany and zoölogy at Tolland, Colorado. The laboratory will be in charge of the regular instructing staff of the university, and there will be courses in elementary biology, plant anatomy, plant taxonomy, and ecology. The location of the laboratory, altitude 8,889 feet, will allow students to study conveniently the plants and animals of all the different life zones from plains to alpine heights.

The bronze memorial tablet reproduced below has been placed in the New York Botanical Garden fern herbarium, which, as a tribute to Professor Underwood, is to be called the Underwood Fern Herbarium.



TORREYA

July, 1909

Vol. 9 No. 7

THE TYPE AND IDENTITY OF DRYOPTERIS CLINTONIANA (D. C. EATON) DOWELL.*

By Ralph Curtiss Benedict

The problem as to the type and identity of *Dryopteris Clintoniana* (D. C. Eaton) Dowell is concerned with two questions: first, as to the material on which the original material was based; second, the identity of this material.

In a recent paper attention was called to the fact that some doubt exists regarding both these questions. As noted at that time, the material in the Yale herbarium identified by Eaton as his *Aspidium cristatum* var. *Clintonianum*, comprises two specimens of *Dryopteris cristata* × *marginalis* as well as several sheets of what is now known as *D. Clintoniana*, but does not include anything collected by Judge G. W. Clinton, in whose honor the fern was named, and whose collection was cited in the original description.

Through information contained in a letter from Mr. G. E. Davenport to Miss Margaret Slosson, it was learned that the original "Clinton" fern had been deposited in the Museum of Natural Science at Springfield, Mass. Thanks to the courtesy of the Springfield Botanical Society, in whose care the specimen was placed, an opportunity was given to examine it, together with a letter of Judge Clinton's concerning it. The letter — said by Mr. Davenport to have been written to John Lewis Russell — reads as follows: "This *Aspidium* troubled me. I could not reconcile it with *A. Goldianum* and it seemed a wide departure from *A. cristatum*. So I sent it to Eaton. Prof. E. answered that he had received it from divers botanists who labelled it *A. Goldianum*, but that he regarded it as a form of *A. cristatum*,

[No. 6, Vol. 9, of Torreya, comprising pages 109–132 was issued June 1, 1909.]

* Illustrated with the aid of the Catherine McManes fund.

At my instance, he named it *cristatum* v. *major* — this accounts for label (in pencil) *a* — the filling up is his. He afterwards to my surprise and gratification, named the form for me in the Manual, and so I also furnish the label marked *b*. — G. W. C.

See sheet no. 2 for label *b*."

Sheet no. 1 with label "a" and the letter just quoted is shown in Figure 1. Sheet no. 2 is doubtfully the same as the other, and as Professor Eaton did not see it, need not concern us in the present nquiry. Both sheets — according to Mr. Davenport's letter — were left by Mr. Russell to Mrs. M. L. Owen, who afterwards deposited them with the Springfield society.

At the time the description was first published — 1867 — Prof. Eaton had for comparison (presumably), in addition to Judge Clinton's specimen, the following sheets, which with three later collections are to be seen in his herbarium to-day in the var. *Clintonianum* cover:

(without name) "Serpentine quarry, New Haven, Connecticut. 1855. Oct. E. [= *Dryopteris cristata* × *marginalis*]."

"*Aspidium cristatum*, Swz. var. *Clintonianum*. Hudson Co., Novæ Caesareæ, in paludubus coll. D. C. E. 1862 — 6 — 16."

"*Aspidium cristatum*, Swz. v. *Clintonianum*, D. C. E. Newark, N. J. Wm. Prower — 1865."

"*Aspidium cristatum* — Sw. — v. *Clintonianum*, D. C. E. Utica, New York. J. A. Paine, Jr., 1865. 'Low swampy woods.'"

"*Aspidium cristatum*, Sw. v. *Clintonianum*, D. C. E. Central New York. J. A. Paine, Jr. 1865."

Of these, all but the first cited correspond to the form now commonly known as *Dryopteris Clintoniana*.

The Clinton label "a" reads as follows:

a. Ex Coll. G. W. Clinton
Aspidium cristatum
var. major
Please fill up & return
Buffalo, New York.
Height of frond 29 inches

The words "*cristatum* var. *major*" are in Eaton's writing. The "Please fill up and return" is in pencil, also the words "Height of frond."

FIGURE 1. The original Clinton specimen.

The original description and comment are as follows:

"*Aspidium cristatum* var. *Clintonianum.* (In A. Gray Manual of Botany Edition 5. 665. 1867.)

Frond in every way larger (2½°–4° long); pinnae oblong-lanceolate, *broadest at the base* (4′ –6′ long, 1′ –2′ broad) deeply pinnatifid, the *divisions* (8–16 pairs) crowded or distant, *linear-oblong* , obtuse, obscurely serrate or cut-toothed, the basal ones sometimes pinnately lobed; veins pinnately forking, the lowest anterior veinlets bearing *fruit-dots near the midvein;* indusium orbicular with shallow sinus, smooth and naked. Swampy woods, New England to New Jersey, New York (G. W. Clinton, &c.), and westward. July.

Rootstock stout, creeping, chaffy (like the stipes) with large bright brown scales. A showy Fern, unlike any European form of *A. cristatum*, and often mistaken for *A. Goldianum.*"

As thus drawn, the description is apparently based both on the Clinton specimen, and on other material, presumably that cited above. The Clinton specimen probably contributed the maximum number of pinnulae as given (16) — the other material, the shape of the pinnae, "broadest at the base," and the minimum number of pinnulae (8). As a matter of fact, the pinnae of the Clinton specimen are not broadest at the base, but are mostly of equal width toward the middle or even broader there. This character, together with the numerous pinnulae — in so-called *D. Clintoniana* rarely as many as 12–14 — the numerous sori per pinnula (mostly 8–9), and the general cutting relate the original Clinton fern to *Dryopteris Goldiana* rather than to *D. cristata* or its so-called variety, Professor Eaton's opinion to the contrary notwithstanding. Positive proof of this relationship is to be found in the cell-structure of the indusia which are unmistakably of the *Goldiana* type, and not to be confused with those of *D. Clintoniana* so-called. That the specimen represents straight *D. Goldiana* is unlikely. It seems more reasonable to consider it as probably a cross, perhaps with the *D. Clintoniana* of recent authors. An illustration of a leaf collected by Mr. Macy Carhart near Lodi, N. J., and identified as this cross, is included for comparison (Figure 2). Further evidence that the Clinton speci-

PLATE 2. *Dryopteris Clintoniana* × *Goldiana* Dowell.

men may be a hybrid is to be found in its sporangia which are nearly all abortive. The few full-sized ones seem to have developed only sterile-looking spores.

But whatever the exact identity of the original Clinton fern, it is clearly different from the *D. Clintoniana* of common usage and the question as to which form may properly bear this name remains for consideration. Under ordinary circumstances, the citation of Judge Clinton's collection together with the fact that the plant was named in his honor would be sufficient to establish as type the single Clinton specimen seen by Eaton and now at Springfield. In the present case, however, the description agrees less with this specimen than with others in the Eaton herbarium. Indeed the origin of the single character which appears to have been derived exclusively from the Buffalo plant — that of the maximum number of pinnulae per pinna — is open to question. In unconformably divided leaves such as are those in question, unless a minimum dimension is agreed upon beforehand, two observers are likely to arrive at very different estimates as to the number of any given part. Furthermore it is not at all impossible that Eaton may merely have "filled in" the label as requested and returned the plant to Judge Clinton, afterwards basing his description on material present in his own herbarium. The facts then seem to justify the somewhat paradoxical treatment of rejecting the Clinton specimen as type of *Dryopteris Clintoniana*, and fixing if possible upon one of Eaton's early specimens of the fern we know now as this species.

The rules suggested by the Nomenclature Commission of the Botanical Club of the American Association for the Advancement of Science in the "Propositions relating to the amendment and completion" of the Vienna rules and recently published in the Bulletin of the Torrey Club (36: 55–74. 1909) seem applicable at least in part, to the present case. Under Proposition 8, No. 3°, is the following statement: "In default of an original specimen, that represented by the identifiable figure or (in default of a figure) description first cited or subsequently published, serves as type."

In Eaton's Ferns of North America, Volume 2, plate 66,

figures 6, 7, 8, and 9 show respectively a pinna, a pinnule, an indusium, and a spore of "*Aspidium cristatum* var. *Clintonianum*." The pinna unmistakably belongs to a leaf of the sort ordinarily identified as *D. Clintoniana*, but is not like those of Judge Clinton's collection. The leaf illustrated is presumably in the Eaton herbarium to-day, and if it can be determined by the figure, should serve as the type. Rules 1° and 2° are inapplicable owing to the exclusion of the Clinton specimen. For purposes of completeness, an amended description of *Dryopteris Clintoniana* is here included.

Dryopteris Clintoniana (D. C. Eaton) Dowell

Aspidium cristatum var. *Clintonianum* D. C. Eaton in A. Gray Manual of Botany, Edition 5: 665. 1867.

Rootstock horizontal, the crown unsymmetrical, with low spreading juvenile sterile leaves, and taller more erect fertile ones, up to 4 feet in length: lamina broadly oblong, acuminate, the pinnae mostly acuminate or long-acute, usually broadest at the base, deeply divided, the divisions oblong, mostly slightly falcate, 8–12, rarely as many as 14 per pinnula (counting those with more than 2 sori, or on sterile or sparsely fertile fronds, those 8 mm. or more long): sori mostly 6–8 per pinnula, the indusia glabrous, with heavy radial ribs, the cells mostly narrow, the walls all very sinuate.

Type in question.

The problems in connection with *Dryopteris Clintoniana* are not ended with the fixing of a type. It appears to be in some respects an extremely variable plant, and a study of a wide range of material with a view to determine the limits of this variation is desirable. Its behavior in hybridization also offers an interesting field for study and affords moreover evidence as to its distinctiveness in addition to that derived from its own characters, for the hybrids, when compared with the corresponding crosses of *D. cristata*, maintain for the most part the well-marked differences of the parent forms. But perhaps the best evidence of the distinctiveness is found in the occasional finds of sterile or partially sterile intermediates between the two species, the only intermediates to be found as far as my experience goes. Description

of this hybrid is best delayed until *D. Clintoniana* shall have been more carefully studied. Credit for its recognition belongs to Dr. Philip Dowell.

In conclusion, I wish to thank Professor A. W. Evans, the Springfield Botanical Society, Miss Margaret Slosson, and Dr. Philip Dowell for favors received in connection with work on this paper.

Columbia University

AMBER IN THE LARAMIE CRETACEOUS*

By T. D. A. Cockerell

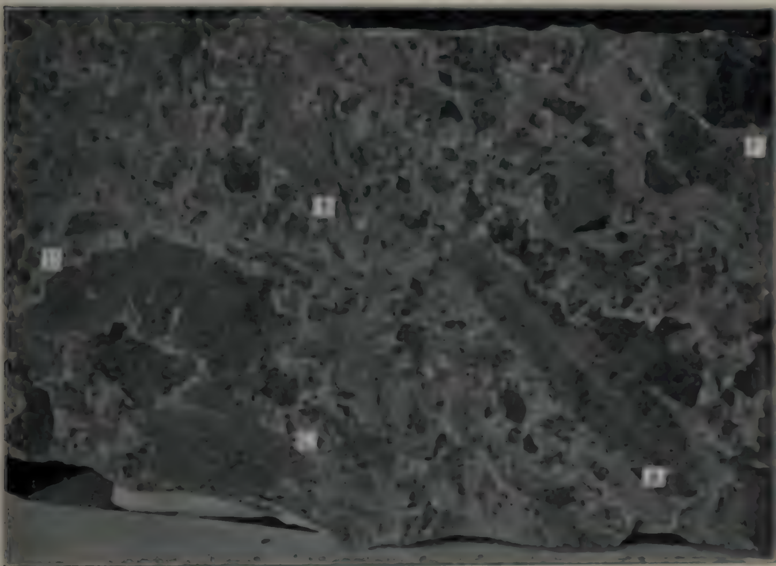
Recently, with the help of my wife and a number of students, I have been investigating the flora of the Laramie Cretaceous at Marshall, Boulder County, Colorado. This locality produces much of the coal used in Boulder, and has long been known to palaeobotanists, having furnished important materials to Lesquereux many years ago. Perhaps the most interesting thing found is a small piece of amber,† embedded in the solid rock. It measures about eight millimeters by five and a half, and is translucent orange-brown, darker than Baltic amber. It is practically insoluble in alcohol ; a small fragment left in it over night was scarcely if at all diminished. In ether it eventually becomes opaque and friable. In Torreya, January, 1907, Mr. E. W. Berry gave a very interesting account of the occurrence of amber in the Cretaceous beds of the Atlantic coast region ; it now appears that this substance is widely distributed in our Upper Cretaceous, and it may be possible that somewhere it will be discovered in large quantities. The discovery of large pieces of Cretaceous amber would be an event of the highest importance, as there seems to be no reason why they should not contain plant remains and insects. Cretaceous insects are exceedingly desirable at the present time, to throw light on the evolution of

* Illustrated with the aid of the Catherine McManes fund.

† In using the term amber for the fossil resin of the Laramie strata, it is only intended to imply that it is a transparent fossil resin, with all the appearances of the substance known as amber. It is of course not the product of the same tree as the Baltic (typical) amber ; indeed, judging from the accompanying foliage, it is very probably not even the product of a conifer.

existing groups; while it is possible that flowers and fruits, could they be found as they are in Baltic amber, would bring about great changes in our conception of some of the Cretaceous genera.

The material containing the amber is a bluish-gray rock, full of plant remains, in the immediate vicinity of the coal. We did not find it in place, but were able to examine a large quantity thrown out on the dump of a coal mine a short distance east of Marshall. The principal plants in this rock were as follows:*



Slab containing fossil plants of Laramie age, Marshall, Colorado; collected by Miss Ruth DeLong and Mr. Ralph Morrill. *A, C, Ficus navicularis* Ckll. (variable). *B,* "*Platanus*" *rhomboidea* Lx. *D,* "*Platanus*" *raynoldsii* Newby. *F, Dombeyopsis obtusa* Lx.? (Note the absence of coniferous remains in the specimen.)

1. *Ficus gaudini* Lx. (*uncata* Lx.). The large leaves are abundant; possibly much of the fossil wood so common at Marshall may belong to this species, but we have made no sections.

2. **Phragmites laramianus** n. sp.; *P. oeningensis* Lx., Tertiary

* Since writing the above account, we have found quantities of amber *in the coal* at Marshall. Much of it was looked over for insects, but so far without success. None of the pieces is large. — April 26.

Flora, pl. viii, f. 1. This is the most abundant species in the deposit. The leaves are broad, and very obtuse at the apex, herein differing from *P. falcata* Kn. of the Yellowstone Laramie and the living *P. phragmites*. It does not seem possible to refer this to *P. oeningensis* A. Br. of the European Upper Miocene ; it is no doubt much nearer to *P. alaskana* Heer, but Heer's plant, so far as positively known, had narrower leaves.

3. *Anemia supercretacea* Hollick. Previously known from the Laramie at Florence, Colorado. First found at Marshall by Paul Haworth. Our specimens run a little larger than Hollick's, but appear to be otherwise quite identical ; the pinnules are entire. The plant may possibly be a variety of *Anemia haydenii* (*Gymnogràmma haydenii* Lx., 1872), which appears to be distinctly different from *A. subcretacea* (Sap.) Gard. & Ett., as originally figured by Saporta. In the genuine *subcretacea* the pinnules are shorter than in *haydenii*, and more irregularly and remotely toothed. *A. perplexa* Hollick seems to me much more like *A. subcretacea*, differing only in the shorter and more broadly cuneate pinnules. Some of the material figured under *A. perplexa* has entire pinnules, and might just as well represent the Marshall plant.

No conifers were identified, though a very imperfect fragment in a piece of coarse sandstone may possibly belong to *Sequoia*.

Cinnamomum affine Lx. and *Juglans leconteana* Lx. were found associated at a different place, whether separated by any noteworthy interval of time I do not know. They appear to come from a higher level.

Sequoia longifolia Lx., which is such a characteristic fossil of the beds above the coal at Austin's Bluff, Colorado Springs, has been recorded from Marshall, but we did not find it, unless the dubious fragment just referred to belongs there.

UNIVERSITY OF COLORADO.

SOME MOULDS FROM PENNSYLVANIA

By David R. Sumstine

In the study of the moulds of North America, the following species have been observed in Pennsylvania. An enumeration of these species may interest mycologists.

Fischer * divides the Mucorinae (Mucorales) into four families, Mucoraceae, Mortierellaceae, Chaetocladiaceae, and Cephalidaceae. No species of the second family have yet been found in our state.

Mucoraceae

Mucor mucedo Linnaeus

This species is widely distributed on horse manure and can readily be cultivated on a decoction of horse manure, on potato, and on bread. It is seldom found on fruits.

Mucor racemosus Fresenius

Found on boiled potatoes, on bread, and on horse manure. It can be cultivated on bread and on potato.

Mucor piriformis Fischer

The specimens referred to this species agree fairly well with the description of Fischer † except the size of the columella and of the spores. In my specimens the columella is pear-shaped 117–150 μ high and 50–117 μ wide at the broadest part. The spores are broadly elliptical, 13–16 μ long and 10–13 μ wide. The spores germinate in the mineral liquid used by Van Tieghem and Le Monnier. ‡ A number of attempts to germinate them in water proved a failure.

The plants grew on the dung of deer, were cultivated on bread, on boiled potato, and on cornmeal.

Phycomyces nitens (Agardh) Kunze

Usually found on oily substances and may be cultivated on ground flaxseed and on cornmeal.

* Fischer, Krypt. Flor. v. Deutschland, etc., 175–177. 1872.

† Fischer, *loc. cit.*, 191.

‡ Van Tieghem et Le Monnier, Ann. Sc. Nat. V. Ser. T. 17 : 267. 1873.

Spinellus fusiger (Link) Van Tieghem

Found on various species of *Mycena.*

Spinellus macrocarpus (Corda) Karsten

This species is also found on species of *Mycena.* Attempts to cultivate this and the former species were unsuccessful.

Sporodinia grandis Link

This is a ubiquitous mould growing on decaying fungi. It has been found on various species of mushrooms.

Rhizopus nigricans Ehrenberg

This is the most common species of the moulds. It grows on all kinds of decaying vegetable matter. It can easily be cultivated and assumes very interesting forms. Occasionally several sporangia appear on one sporangiophore. Peculiar thickenings occur frequently in the sporangiophores. The spores germinate in water.

Thamnidium elegans Link

The habitat of this species is on the manure of the tiger and of the horse. It has been cultivated on orange, on bread, on carrot, in Pasteur's solution with gelatine.

The manure of the tiger was obtained from the Pittsburgh Zoo.

Circinella umbellata Van Tieghem et Le Monnier

Grows on the manure of the tiger and of the horse, usually in company with *Thamnidium elegans.* Cultivated on orange, on bread, and in Pasteur's solution with gelatine.

Chaetostylum fresenii Van Tieghem et Le Monnier

This species was found growing among other moulds on an old decaying *Polyporus.*

Pilobolus crystallinus (Wiggers) Tode

Rather abundant on horse manure.

Chaetocladiaceae

Chaetocladium brefeldii Van Tieghem et Le Monnier

Grows parasitically on other mucors on horse manure. It was also found on *Phycomyces nitens* growing on flaxseed meal.

CEPHALIDACEAE

Piptocephalis repens Van Tieghem

Very common among other moulds on horse and dog manure. It is parasitic on other moulds.

PITTSBURGH, PENNSYLVANIA

SHORTER NOTES

A New Name.—**Pentstemon Metcalfei** Wooton & Standley, nom. nov.

P. puberulus Wooton & Standley, Bull. Torrey Club **36**: 112 4 Mr 1909.

Not *P. puberulus* M. E. Jones, Contr. Western Bot. **12**: 64. 1908.

Prof. A. A. Heller kindly called our attention to the fact that the name *P. puberulus* was used last year by Mr. Jones. We had Mr. Jones' paper at hand at the time of naming the plant but had neglected to examine it for new species of *Pentstemon*.

E. O. WOOTON

AGRICULTURAL COLLEGE, NEW MEXICO

A "WEEPING" SPRUCE.—Some weeks ago Miss Helen Stewart brought to Teachers College a specimen of a curious spruce tree which was collected about one hundred miles north of Winnipeg. The Indian guides call it the "Unknown Tree," and claim that it is the only one in existence. The tree is described as about sixty feet high, with the lower branches at least twenty feet from the ground; the strikingly pendulous branches are six or more feet long, slender, and themselves but little branched. About the same time a specimen was taken to the New York Botanical Garden; the rather indefinite description of the locality indicates that the two specimens came from the same place, and possibly from the same tree. Dr. Britton has pronounced it a "weeping" spruce, probably *Picea canadensis*; the twigs are thicker than usual (due perhaps to its peculiar habit of growth) but the sterigmata indicate *P. canadensis*.

JEAN BROADHURST

REVIEWS

West and West's Monograph of British Desmidiaceae. Vol. III*

In their third volume of the British Desmidiaceae, W. and G. S. West have nearly completed the genus *Cosmarium*, fifty species of which were already taken up in the latter part of volume two. In this third volume one hundred and seventy three species with their several varieties are taken up and illustrated by thirty plates (65–95), partly colored. The general plan of the earlier volumes is followed: synonymy, description, distribution, and general notes under each species. One new species, *Cosmarium entochondrum*, is described, also thirteen new varieties. In addition several new forms are described and a number of changes of rank and position made.

The figures are excellently drawn and in many cases show front, vertical, side, and basal views of the same specimen. The colored figures show the arrangement of the chloroplasts and pyrenoids in a number of species. In a very few cases variations of ornamentation are definitely shown.

The volume shows our great lack of knowledge of the sexual phases of the life history in this group, the number of species with zygospores being but 15 per cent. of the total and in some of these the zygospores are not mature. In a group as variable as the Desmidiaceae this lack of the sexual characters is all the more felt in determining the true relationships of apparently very similar forms.

This volume will do much to help the study of this genus, which has been difficult on account of the great number of species and the scattered literature.

JOSEPH A. CUSHMAN

PROCEEDINGS OF THE CLUB

MAY 11, 1909

The meeting was held at the American Museum of Natural History with Vice-president Barnhart in the chair. Ten persons were present.

* West, W. and West, G. S. Monograph of British Desmidiaceae. Vol. III. 1908. Ray Society. Dulau and Co., London.

Resignations were accepted from Miss Lenda Tracy Hanks, Miss Helen D. Nelson, and Mr. Arthur Smith.

The scientific program of the evening consisted of a lecture by Dr. William A Murrill on "Edible Fungi", illustrated by specimens and by lantern slides.

Mushrooms were discussed from the popular side as objects of interest and as valuable relishes. The development and cultivation of the common field mushroom were briefly described. Poisonous species and their effects were described with care, and comparisons were made with edible species liable to be confused with them.

Fresh specimens of four early species were exhibited: the glistening ink-cap, *Coprinus micaceus*, which appeared the last week in April; the shaggy-mane, *Coprinus comatus*, which appeared about May 10 (unusually early for this species); *Pleurotus sapidus*, a relative of the oyster mushroom, just beginning to appear on old logs and stumps; and the morel, *Morchella*, which occurs on the ground in woods during May.

Lantern slides were used to illustrate the more important local species of edible fungi, beginning with agarics found on lawns and in fields, such as species of *Agaricus*, *Lepiota*, *Coprinus*, *Hypholoma*, and *Marasmius*. Species occurring on the ground in woods were next discussed, including *Lactaria*, *Russula*, *Tricholoma*, *Clitocybe*, and other important genera of gill-fungi. Wood-loving forms comprise a number of important species that are abundant and much used, such as *Armillaria meilea*, *Hypholoma perplexum*, *Pleurotus ostreatus*, *Pleurotus sapidus*, *Coprinus micaceus*, and *Collybia velutipes*.

Other groups of fungi containing edible species, were illustrated by *Clavaria*, *Hydnum*, certain tender forms of *Polyporus*, several species of *Boletus*, and a number of species of *Lycoperdon*. All species of coral-fungi and puffballs were recommended for food, provided the specimens were tender, young, and fresh.

Adjournment followed.

MARSHALL A. HOWE,
Secretary pro tem.

OF INTEREST TO TEACHERS

Secondary School Agriculture

The March number of *School Science and Mathematics* has an article by D. O. Barto on problems in secondary school agriculture which is interesting to teachers of nature study in the grades and to teachers in the high school. The lack of success in the grades is explained as follows:

"It must not be forgotten that agriculture is largely a science study. It requires some knowledge of the principles of many sciences, and the ability and interest to apply them intelligently. These conditions of scholarship can be expected only in pupils of a certain breadth and maturity of development and comprehension seldom found in the elementary grades.

"A pupil can make little headway in the study of agriculture unless he knows something of physiography, geology, botany, zoölogy, physics and chemistry. It is not a question of whether he has studied these sciences before he takes up agriculture whether he pursues them as separate subjects or learns them as he studies agriculture. The important thing is that some knowledge of these other subjects is indispensable to any serious and effective work in the study of agriculture, and this is a qualification that can hardly be expected to be attained in the elementary grades.

"There is much valuable work that is scientific and agricultural that may be done — should be done — in the elementary grades when we have teachers prepared for it. But agriculture is an applied science. It has won its way only by demonstrating to the farmer that it could be made of practical service to him. As a school study its value and usefulness will largely depend upon the results that can be obtained from the application of principles of science, and this work will demand a sustained interest that young children cannot furnish."

With regard to the conditions in the secondary schools much of the above is true, especially where the work is placed in the lower high school years. Mr. Barto, however, gives in this article some encouraging results of work being done in Illinois.

A key to the common winter trees about Milwaukee which is not so local as the title indicates appears in the April *School Science and Mathematics*. The author, I. N. Mitchell, has made the key simple enough for high school pupils.

Dr. John M. Coulter has an article on teaching botany in the April *School Science and Mathematics* in which the current conditions are discussed under the headings of the prepared teacher, economic botany, biological grouping, and the point of interest.

The April *Journal of the New York Botanical Garden* contains three illustrated articles which will prove interesting to the general reader: one on the fern collections of the Garden by Ralph C. Benedict, another on East Indian economic plants written by Percy Wilson, and an account of some experiments on the effect of the soil of the Garden hemlock grove upon seedlings by Winifred J. Robinson.

Viewing the government as a teacher, Mr. L. B. Stowe, in the *Outlook* for April 17, enumerates the scientific principles demonstrated within the past few years, and gives interesting concrete illustrations. Those of special interest to us are connected with forest and staple crop protection and with improved methods of farming, such as following the contours of the hill in plowing a hillside instead of plowing straight across the slope.

The April *Plant World* contains two papers which were read at the Baltimore meeting of the American Association for the Advancement of Science: one on overlapping habitats as observed in Mexico by Francis E. Lloyd; and another by W. M. Crocker and L. I. Knight on the effect of illuminating gas upon the flowers of both cut and growing carnations, and the losses sustained by florists through defective pipes, even where chemical tests failed to reveal the presence of gas.

The University of Colorado has recently issued a botanical number as the first number of its sixth volume of studies. The

magazine, which should prove interesting to all botanical students in that region, is illustrated, and contains papers by the members of the biological staff on the "botanical opportunity in Colorado", on the mesa and foothill vegetation, especially with relation to physiography and climate, with the distribution of conifers and deciduous trees, and a bibliography and history of Colorado botany.

Dr. O. F. Cook in discussing the history of the cocoanut palm says: "It has long been thought that the cocoanut palm presents a perfect example of adaptation to a littoral environment, but this idea is delusive. The tough outer rind which is popularly supposed to have been developed as a protection against sea water is really to guard the cocoanut when it falls, and give it favorable conditions for germination. Cocoanuts require a certain amount of salt in the soil, but this condition is satisfied by soils in some interior localities as well as on the seacoast. Considerable sunshine is also needed. This, however, is met better in arid regions than by a coastal habitat and the care with which the milk is protected would argue in the same direction. Far from being a wild plant the cocoanut does not appear to thrive long away from human beings and in spite of the supposed diffusion of the tree by oceanic currents no instance of the kind is known."

A freak dandelion, *Taraxacum taraxacum* (L.) Karst., is described by M. P. Somes in the April *American Botanist:*

"In place of the scape which all self-respecting dandelions rear aloft, this 'freak' had a stem, amply provided with leaves — not in whorls, if you please, but alternate. The tip of the flower stalk was bifurcate and bore two heads, rather smaller than the average but perfect in other respects. Near the base of the stem to still further emphasize the abnormality was an auxiliary peduncle tipped by an immature head. There were several plants with this leafy stem habit and all very similar in the forked flower stalk. The soil was an ordinary black earth quite moist but in no way noticeably peculiar and six feet away in the same soil were normal plants of the same species. A friend, who is

somewhat severe in his strictures regarding the activity of taxonomists and the resulting multiplicity of synonyms, suggests that I describe this form as a new species and call it *T. paradoxa*. However it may be of interest to some to know that *Taraxacum taraxacum* (L.) Karst. (*T. officinale* Weber, *T. dens-leonis* Desv. etc., etc.) does not always have a scape nor is its inflorescence always a single head."

The April *Bulletin of the Torrey Botanical Club* contains a very interesting article by George E. Stone on the power of growth of ostrich ferns (*Onoclea Struthiopteris* Hoffm.). Young fronds which forced their way through a concrete (rolled tar and gravel) border, about three inches thick, and so hard that a "heavy stroke from a sledge-hammer makes little or no impression upon it," initiated some experiments to show the great force exerted by the young ferns. A lever, weights, and a round piece of wood "of the same dimensions as the undeveloped cluster of fern fronds" constituted the apparatus. The pressure required to break through the concrete in ten to fifteen days, the time usually required by the ferns was 264 pounds in 10 days and 189 pounds in 13 days, Mr. Stone estimates that the work actually accomplished by the ferns is at least 35 atmospheres, and refers to Pfeffer's corn root record of 24 atmospheres, and Clark's squash experiment where a squash developed under a weight of 5,000 pounds, but which, however, represented a cell pressure of but 2–3 atmospheres.

The report of the American Chemical Society, made by the committee appointed to coöperate with the National Conservation Committee, contains some facts of botanical interest, as shown by the following extracts: "In forestry also, the influence of the chemist is distinctly felt. The sprays, used for destroying noxious insects, are chemical preparations. The manufacture of wood alcohol is a chemical process, which may be either wasteful or economical. Turpentine is now produced wastefully, but the waste can be diminished by careful refining, and furthermore, the chemist can aid in discovering substitutes for it. Substitutes for

tan bark are also to be sought for by means of chemical investigations. Another distinctly chemical operation is the preparation of wood pulp for paper making, a process which is now wasteful in the highest degree. It is estimated that for every ton of pulp now made by the sulphite process more than a ton of waste material is allowed to drain away into our streams. How to make this material useful is a chemical problem, and so also, in great part, is the investigation of other, now useless fibers, which may replace the more valuable wood. The preservation of wood from decay is still another art in which chemistry is predominant.

"In preserving the fertility of our land, chemistry has an important part to play. Our knowledge of fertilizers, of the food on which crops can thrive, is entirely chemical so far as accuracy is concerned, and must be applied in accordance with chemical principles. A fertilizer which is useless, and therefore wasted on one soil, may be needed on another. Certain fertilizers, like the Stassfurt salts, Peruvian guano, the Chilean nitrates, and phosphate rock are limited in quantity, and their future exhaustion must be considered now. What shall replace them in the future? Already processes have been devised for fixing the nitrogen of the atmosphere and rendering it available for plant food. Saltpeter and other nitrates can be and long have been made from waste materials such as old mortar and animal refuse. The phosphatic slags have been mentioned in connection with metallurgical processes. These sources of fertility are important, but greater still is the source found in our municipal sewage. The problem of its salvage has been worked out in some localities, but in the United States the people are only beginning to be aroused to its importance. Enormous masses of material, easily available for fertilizing purposes, now drain into our rivers or directly into the sea. Another question, now under investigation, is the possibility of using our common feldspathic rocks in fine powder, to replace the potassium withdrawn by plants from the soil."

TORREYA

August, 1909

Vol. 9 No. 8

RHIPSALIS IN THE WEST INDIES *

By N. L. Britton

Rhipsalis is a genus of leafless jointed cacti, with round, angled, or flat branches and small flowers, consisting of numerous species, mostly natives of tropical America, but a few species occur in eastern tropical Africa and the widely distributed *R. Cassutha* grows also in Ceylon. In this Old World distribution the genus differs from all other cacti, the family being otherwise American in distribution, except for several Opuntias, which have become naturalized in southern Europe and northern Africa.

These African species are of great interest from the standpoint of geographic distribution because they are the only cacti native in any part of the Old World. From the large preponderance of species in America it seems certain that the ancestors of the African kinds must have been transported from the American tropics to those of Africa in past geologic time, and the method of transportation, unless there was land connection between the continents, can only be guessed at. There are many genera in other families of plants common to the American and African tropics, however, and this indicates the probability of former land connection, over which their ancestors might have spread by well-known natural means.

The genus was established by Gaertner (Fruct. & Sem. **1**: 137. 1788), the type species being *R. Cassutha* Gaertn. Adanson (Fam. Pl. **2**: 243. 1763) had previously proposed the generic name *Hariota*, for presumably the same species (Plumier, Plant. Amer. 190, *pl. 197. f. 2*), and this figure is cited by Linnaeus (Syst. ed. 10, 1054. 1759) under *Cactus parasiticus*, but Linnaeus at the same place, and before his citation of Plumier's figure,

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* Illustrated with the aid of the Catherine McManes Fund.

cites Sloane, Jamaica, *pl. 224. f. 3 and 4*, which is a species of *Vanilla*, probably *V. Eggersiana* Rolfe. Inasmuch as Adanson did not typify *Hariota* binominally, and as the type of *Cactus parasiticus* L. is a *Vanilla*, it would appear that the name *Hariota* must be passed over, although it was taken up by Dr. Otto Kuntze (Rev. Gen. Pl. 261. 1891), and the species of *Rhipsalis*

FIG. 1. *Rhipsalis Cassutha* Gaertn. Near Utuado, Porto Rico. Photographed by Dr. Marshall A. Howe.

known to him transferred to it. Through Linnaeus's blunder of uniting two widely different plants, which he knew only from illustrations, we are apparently prevented from using the name *Hariota*, and the next oldest available generic name is *Rhipsalis*.

The species of *Rhipsalis* are mainly epiphytic, drooping from

trees, though sometimes found on cliffs, and they are mesophytes rather than xerophytes, inhabiting moist or wet regions. Some of them bear spines or bristles at the areoles of young shoots, which usually fall away early, leaving the mature plants quite unarmed, but a few South American species bear spines even when mature. Their flowers are whitish, yellowish, or pink, often almost rotate when widely expanded, the perianth segments few, the perianth-tube short or none; the stamens are few or numerous and shorter than the perianth; the fruits are globular or oblong, white or yellowish berries with a watery pulp full of small seeds.

Three species are now known from the West Indies, which may be classified as follows:

Joints terete, slender (*Eurhipsalis*). 1. *R. Cassutha.*
Joints flat (*Phyllorhipsalis*).
  Joints 4–6 cm. wide; flowers 15 mm. long; berry oblong. 2. *R. alata.*
  Joints 1–2.5 cm. wide; flowers 6 mm. long; berry subglobose. 3. *R. jamaicensis.*

1. **Rhipsalis Cassutha** Gaertn. Fr. & Sem. **1**: 137. 1788

Cassytha filiformis Mill. Gard. Dict. Ed. 8. 1768. Not L.
Cactus parasiticus Lam. Encycl. **1**: 541. 1783. Not L.
Cactus pendulus Sw. Fl. Ind. Occ. **2**: 876. 1800.
Cactus caripensis H.B.K. Nov. Gen. **6**: 66. 1823.
Cereus caripensis DC. Prodr. **3**: 467. 1828.
Rhipsalis parasiticus DC. Prodr. **3**: 476. 1828.
Cactus fasciculatus Willd. Enum. Suppl. 33. 1813.
Rhipsalis parasitica Haw. Syn. Pl. Succ. 187. 1812.
Rhipsalis fasciculata Haw. Suppl. 83. 1819.
Rhipsalis cassythoides G. Don, Gen. Syst. **3**: 176. 1834.
Rhipsalis dichotoma G. Don, Gen. Syst. **3**: 176. 1834.
Rhipsalis undulata Pfeiff. Enum. 156. 1837.
Rhipsalis Hookeriana G. Don, Gen. Syst. **3**: 176. 1834.
Hariota parasitica Kuntze, Rev. Gen. Pl. 262. 1891.

Plant often 1 m. long or longer, much branched, light green, pendent from trees or on cliffs, the branches flexible; flowers 6–8 mm. long; petals about 4, ovate, obtuse; stamens about 9. [FIGURE 1.]

TYPE LOCALITY: Not cited.

Illustrations: Gaertn. *loc. cit. pl. 28. f. 1;* Hook. Exot. Fl. **1**: *pl. 2;* Lodd. Bot. Cab. *pl. 865;* Bot. Mag. *pl. 3079, 3080;* DC. Pl. Grasses, *pl. 59.*

Distribution: Cuba: Matanzas (*Rugel 767; Britton & Shafer 450*); Madruga (*Britton & Shafer 788*); Calicita near Cienfuegos (*Combs 470*); vicinity of San Luis, Oriente (*Pollard & Palmer 356; Maxon 4012*). Haiti: Port Margot to Corneil (*Nash 228*); La Brande to Mt. Balance (*Nash & Taylor 1660*). Porto Rico: Yauco (*Garber 63; Sintenis 3823*); between Aibonito and Cayey (*Heller 516*); near Aibonito (*Underwood & Griggs 488*). Jamaica: near Rio Grande Ford, Cuna Cuna Trail (*Fredholm 3207*); Belvidere (*Harris 7646*); vicinity of Castleton (*Maxon 836*); Moneague (*E. G. Britton 2956*). San Luis Potosi, Mexico, to Costa Rica, Colombia, Bolivia, Venezuela, and Brazil. Tropical Africa. Mauritius. Ceylon.

The young shoots are often quite bristly, but the mature plant becomes smooth; flowers are sometimes developed before the bristles fall away. In the West Indies the plant has not been observed by me at a greater altitude than about 500 meters.

2. **Rhipsalis alata** (Sw.) Schum. Fl. Bras. **4**[2]: 288. 1890

Cactus alatus Sw. Prodr. 77. 1788.

Cereus alatus DC. Prodr. **3**: 470. 1828.

Rhipsalis Swartziana Pfeiff. Enum. 131. 1837.

Hariota alata Kuntze, Rev. Gen. Pl. 262. 1891.

Rhipsalis Harrisii Gürke, Monats. Kakt. **18**: 180. 1908.

Pendent from trees and on rocks, sometimes 5 meters long, with several long branches; joints broadly linear, lanceolate or linear-oblong, often constricted at the middle or above it, bluntish at the apex, decurrent below into a stipe-like base, rather fleshy, bright green, about 1 mm. thick, 2–4 dm. long, 4–6 cm. wide, the midvein prominent and stout, the margins crenate-undulate, the lower crenations 1–2 cm. long, the upper ones 4–8 mm. long, the main lateral veins ending in the sinuses; flowers yellowish-white, about 15 mm. long; petals 10, lanceolate, acutish, the outer slightly longer than the inner, erect and nearly parallel; stamens numerous, about one half as long as the petals; style slender, about three times as long as the five linear stigmas; berry ovoid, rounded at both ends, yellow-green, 1 cm. long. [Figure 2.]

FIG. 2. *Rhipsalis alata* (Sw.) Schum.

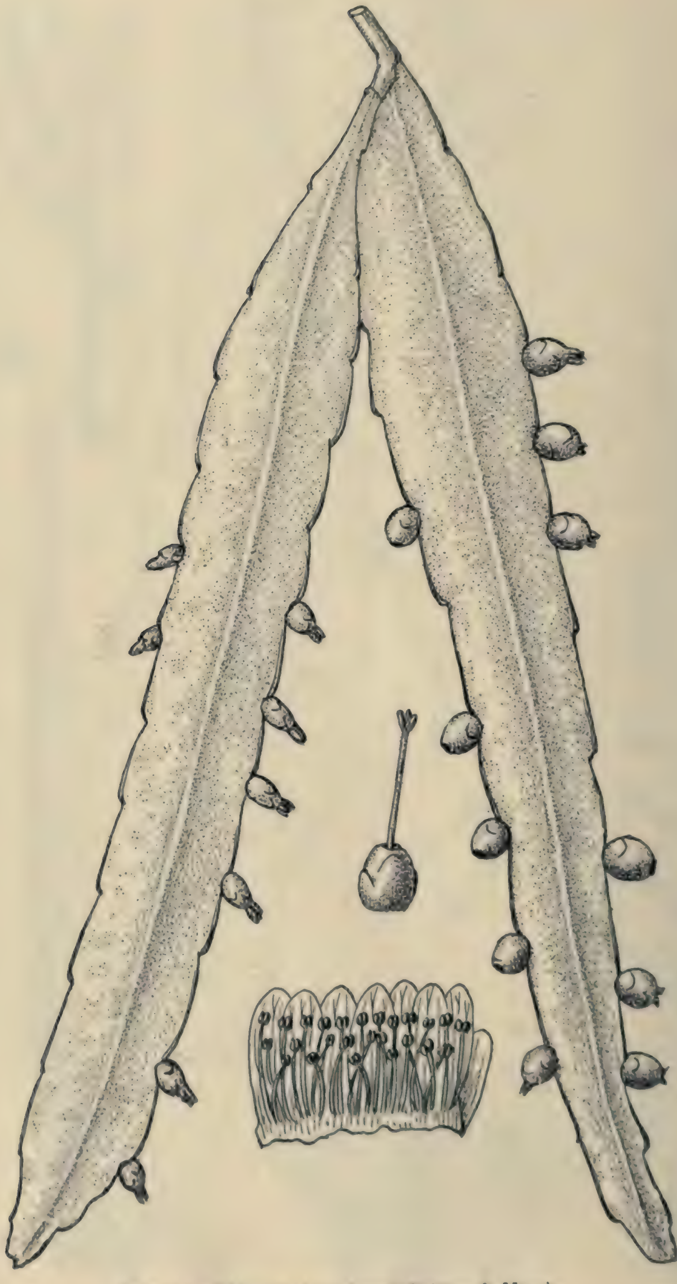

FIG. 3. *Rhipsalis jamaicensis* Britton & Harris.

Jamaica: Woodstock, near Newmarket, Westmoreland (*Britton 1583*; *Harris 9995*); Belvidere, Hanover (*Harris 7619*); Kempshot, Hanover (*Britton & Hollick 2408*); Mandeville, Manchester (*Britton 3751*). The plant flowers in autumn.

This species has been misinterpreted by authors, commencing with Grisebach (Fl. Br. W. I. 302. 1860) and the name *alatus* applied to the other somewhat similar plant of Jamaica to be described below. I have satisfactorily identified it from Swartz's description, and by the aid of a tracing of a type specimen preserved in the herbarium of the British Museum of Natural History, kindly sent at my request by Mr. A. B. Rendle, and Professor Urban informs me that the Swartz specimen preserved in the Stockholm Herbarium is also certainly this species.

The name *Rhipsalis alata* is to be found incidentally mentioned under *Cereus alatus* in Steudel, Nomencl. ed. 2, **1**: 333, published in 1841, without any description of the plant referred to, and is therefore a hyponym to be disregarded.

3. **Rhipsalis jamaicensis** Britton & Harris, sp. nov.

Pendent from trees, the young shoots quite bristly, the older joints smooth; plant 3–10 dm. long, the main axis angular; joints 1–4 dm. long, 1–2.5 cm. wide, dull green, about 2 mm. thick, the apex bluntish, the base narrowed into a stipe 1–6 cm. long, the margins low-crenate; flowers yellowish green, about 6 mm. long, the petals about 7, oblong to oblanceolate, not very widely expanding, obtusish; ovary oblong, with a few scales; stamens 20–24; style much longer than the three oblong stigmas; berry globose, white, 6–8 mm. in diameter. [Figure 3.]

Jamaica: Troy, Cockpit Country (*Britton 511*, type); vicinity of Troy (*Maxon 2813*); near Montpellier (*E. G. Britton 2863*); Bath to Cuna Cuna Gap (*Britton 3502*).

In "Gesamtbeschreibung der Kakteen.," p. 636, the late Professor Schumann, erroneously describing this plant as *Rhipsalis alata*, refers the Costa Rican *Rhipsalis coriacea* Polak. Linnaea **41**: 562, 1877, to it as a synonym. This species is, perhaps, its closest relative, but after growing the two side by side at the New York Botanical Garden, I am convinced that they are distinct.

Visitors to the New York Botanical Garden will find the collection of *Rhipsalis* in Range 1, House No. 7, of the public conservatories.

NOTES ON THE FLORA OF CENTRAL AND SOUTHERN DELAWARE

By Charles S. Williamson

So little is known of the flora of central and southern Delaware, that the following notes on specimens collected by members of the Philadelphia Botanical Club, during the summers of 1907 and 1908, may be of interest.

The first trip was taken by Messrs. Brown, Van Pelt and B. Long on September 21, 1908. Its purpose was to find a good location for the Symposium of 1909. The vicinities of Townsend and Millsboro were visited.

The Symposium was held at Georgetown, July 4 to 9. The attendance was very small, there being at no time more than five and on the first and last days only two botanists present. There were no formal meetings, but many interesting plants were found.

The afternoon of July 4 was spent on "the Hammock," about two miles east of Georgetown.

Other botanizing grounds visited in the vicinity of Georgetown were, Morris Pond, a large mill dam about eight miles east of our headquarters, Milton and the salt marshes beyond, Laurel and Bethel, Rehoboth, and Ellendale.

On July 20 Messrs. Van Pelt and Long visited Milford and Ellendale and collected many plants that had been overlooked or that were not in bloom on July 9.

On August 20 the same gentlemen, with Mr. E. B. Bartram, made a trip to Middletown and Smyrna, hoping to find *Alnus maritima* within the club limits. In this they were not successful, but they did find several plants that were new to the herbarium.

Finally, on August 29 I revisited several of the localities at which we had collected during the Symposium.

Pinus Strobus L. Rare, observed only east of Milton.

Pinus echinata Mill. Between Georgetown and Laurel.

Pinus taeda L. Abundant everywhere.

Taxodium distichum (L.) L. C. Rich. Between Bethel and Laurel; a number of trees, one at least four feet in diameter. No fruit seen.

Chamaecyparis thyoides (L.) B.S.P. Bethel, Millsboro. Not common.

Potamogeton pulcher Tuckerm. Morris Pond.

Naias gracillima (A. Br.) Morong. Pond north of Rehoboth. Mill pond at Milford.

Erianthus compactus Nash. Hammock east of Georgetown.

Manisuris rugosa (Nutt.) Kuntze. Ellendale; abundant along railroad ditches and in damp meadows. Hammock east of Georgetown.

Andropogon argyraeus Schultes. Dry sand, Rehoboth. Millsboro.

Paspalum plenipilum Nash? Georgetown and Ellendale.

Amphicarpon Amphicarpon (Pursh) Nash. Ellendale, very abundant.

Brachiaria digitarioides (Carpenter) Nash. Millsboro.

Sacciolepis gibba (Ell.) Nash. Borders of pond north of Rehoboth. Millsboro.

Chaetochloa magna (Griseb.) Scrib. Near Smyrna Landing.

Heleochloa schoenoides (L.) Host. Smyrna Landing

Sporobolus Torreyanus (R. & S.) Nash. Ellendale.

Gymnopogon ambiguus (Mx.) B.S.P. Ellendale.

Eragrostis refracta (Muhl.) Scrib. In water, east of Georgetown.

Cyperus microdontus Torr. In field east of Georgetown. Smyrna Landing.

Cyperus pseudovegetus Steud. Damp soil, Georgetown and Ellendale.

Eleocharis mutata (L.) R. & S. In water, common in eastern Delaware.

Eleocharis Robbinsii Oakes. Morris Pond and Milford.

Eleocharis tortilis (Link) Schultes. In a wood east of Georgetown. Millsboro.

Eleocharis Torreyana Boeckl. Ellendale and Milford.

Eleocharis melanocarpa Torr. Ellendale.

Scirpus subterminalis Torr. Morris Pond.

Rynchospora macrostachya Torr. Milford.

Rynchospora axillaris (Lam.) Britton. Ellendale.

Eriocaulon Parkeri Robinson. Morris Pond, Milford, Rehoboth and Millsboro.

Arisaema pusillum (Peck) Nash. Millsboro.

Juncus repens Michx. Georgetown, Ellendale, and Smyrna, in ditches.

Helonias bullata L. Milford.

Melanthium Virginicum L. East of Georgetown.

Gyrotheca tinctoria (Walt.) Salisb. The Hammock east of Georgetown.

Pogonia divaricata (L.) R.Br. One fruiting specimen found July 21, 1908, at Ellendale in a meadow a few hundred yards east of the town. Rather abundantly in bloom in the same meadow on June 21, 1909.

Tipularia unifolia (Muhl.) B.S.P. Rather common in a woods about two miles east of Georgetown. In full bloom July 5, 1908.

Gyrostachys simplex (A. Gray) Kuntze. Rehoboth; more common than *G. gracilis* (Bigel.) Kuntze.

Gyrostachys praecox (Walt.) Kuntze. Hammock east of Georgetown. Marsh east of Milton.

Blephariglottis lacera (Mx.) Rydberg. The Hammock, Georgetown.

Populus heterophylla L. Townsend.

Myrica cerifera L. Common around ponds.

Hicoria villosa (Sarg.) Ashe. Milton.

Alnus maritima (Marsh.) Muhl. Rather common. Milford (in bloom July 20), Morris Pond. West of Bethel and Millsboro mostly on the borders of ponds.

Castanea pumila (L.) Mill. Near Noxontown Pond, Middletown.

Quercus nigra L. Very abundant everywhere but no fruit seen in 1908.

Quercus Michauxii Nutt. Georgetown.

Polygonum Careyi Olney. Abundant along roadside east of Georgetown.

Polygonum Opelousanum Riddell. Ellendale and Georgetown.

Silene alba Muhl. Near Smyrna Landing.

Cabomba Caroliniana A. Gray. Milford, in stream flowing through the town. Perhaps an escape but very abundant and luxuriant.

Itea Virginia L. Milford.

Prunus angustifolia Mx. Between Milford and Ellendale and at Noxontown Pond.

Cracca spicata (Walt.) Kuntze. Dry roadsides, Georgetown and Laurel.

Stylosanthes riparia Kearney. Near Georgetown.

Meibomia viridiflora (L.) Kuntze. Georgetown, Milford and Van Dyke.

Meibomia stricta (Pursh) Kuntze. Common in dry fields, Milford, Ellendale and Georgetown.

Lespedeza striata (Thunb.) H. & A. Rehoboth and Ellendale.

Lespedeza Stuvei Nutt. Laurel (not in bloom), Rehoboth, in bloom.

Lathyrus myrtifolius Muhl. Near Milton.

Clitoria Mariana L. Along roadside between Milford and Ellendale.

Galactia regularis (L.) B.S.P. Common.

Galactia volubilis (L.) Britton. Georgetown and Laurel, along dry roadsides.

Dolicholus erectus (Walt.) Vail. Georgetown and Laurel, along dry roadsides.

Oxalis corniculata L. Smyrna and Ellendale, along roadsides.

Linum striatum Walt. Leaves all or nearly all alternate, common east of Georgetown.

Polygala cymosa Walt. Very abundant in the hammock east of Georgetown. Along railroad south of Ellendale.

Polygala ramosa Ell. Very abundant in meadow with *Pogonia* and along the railroad east of Ellendale.

Polygala incarnata L. Along roadsides, Georgetown and Rehoboth.

Polygala Mariana Mill. Georgetown and Ellendale, in both damp and dry soil.

Polygala lutea L., *P. cruciata* L., and *P. Nuttallii* were also common.

Crotonopsis linearis Mx. Common in both damp and dry soil, in meadows and in woods at Ellendale and Georgetown.

Rhus Toxicodendron L. Laurel, along roadside.

Kosteletzkya Virginica (L.) A. Gray. Salt marsh east of Milton, Rehoboth.

Hypericum adpressum Bart. Ellendale.

Hypericum virgatum Lam. Very abundant in Ellendale, and in the Hammock, Georgetown.

Triadenum petiolatum (Walt.) Britton. Milford, Morris Pond and Millsboro.

Elatine Americana (Pursh) Arn. Near Noxontown Pond. Some of the plants are very large, forming rosettes eight inches in diameter.

Viola Brittoniana Pollard? Rehoboth, leaves very leathery.

Rhexia aristosa Britton. Abundant in ditches along railroad east of Ellendale.

Ludwigia sphaerocarpa Ell., *L. linearis* Walt. and *L. hirtella* Raf. Abundant at Ellendale and in the Hammock. Georgetown.

Myriophyllum pinnatum (Walt.) B.S.P. Morris Pond.

Hydrocotyle umbellata L. and *H. verticillata* Thunb. Borders of pond south of Rehoboth.

Pyrola secunda L. Milford.

Chronanthus Virginica L. Common.

Sabbatia campanulata (L.) Torr. In the meadow east of Ellendale.

Gentiana puberula Mx.? One clump (not quite in bloom) along railroad south of Ellendale. The rough stems, long calyx and corolla lobes and stamens free, even in the bud seem to designate this species. On the trip of June 21, 1909, a large number of plants, which may be this species, were noted in the meadow with the Pogonia.

Bartonia Virginica (L.) B.S.P. and *B. lanceolata* Small. Ellendale. The latter more common, growing as a twining vine.

Limnanthemum lacunosum (Vent.) Griseb. Rehoboth.

Limnanthemum aquaticum (Walt.) Britton. Morris Pond and Milford.

Apocynum pubescens R. Br. Near Georgetown.

Apocynum Milleri Britton. Bethel.

Asclepias rubra L., *A. decumbens* L., and *A. variegata* L. were found near Georgetown and *A. verticillata* L. at Rehoboth.

Acerates Floridana (Lam.) Hitchc. Along railroad south of Ellendale.

Vincetoxicum hirsutum (Mx.) Britton. Near Noxontown Pond.

Physostegia Virginiana (L.) Benth. Roadside east of Georgetown. Perhaps introduced.

Stachys Atlantica Britton. Ellendale.

Koellia aristata (Mx.) Kuntze. Dry roadsides, Georgetown.

Gratiola sphaerocarpa Ell. Ellendale and Milford.

Gerardia linifolia Nutt. Ellendale, and in the hammock, Georgetown.

Pedicularis lanceolata Mx. Townsend.

Utricularia juncea Vahl. Millsboro.

Utricularia resupinata B. D. Greene. Milford. Abundant. In bloom July 20.

Utricularia inflata Walt. Below the dam Morris Pond.

Utricularia radiata Small. Common in ditches. Georgetown and Ellendale.

Utricularia cleistogama (A. Gray) Britton. In the hammock, Georgetown.

Utricularia fibrosa Walt., *U. gibba* L., *U. subulata* L., and *U. purpurea* Walt., also occurred at Morris Pond. The last was common in the railroad ditches south of Ellendale.

Tecoma radicans (L.) D.C. Common especially at Rehoboth.

Ruellia parviflora (Nees) Britton. Not uncommon on the edges of thickets at Rehoboth.

Oldenlandia uniflora L. Millsboro and Rehoboth. Plants much taller than those found in New Jersey.

Galium pilosum punctulosum (Mx.) T. & G. Sandy roadsides Georgetown.

Viburnum subtomentosum. Near Noxontown Pond.

Lobelia elongata Small ? Millsboro.

Lobelia paludosa Nutt. Along railroad east of Ellendale.

Lobelia Canbyi A. Gray. Very abundant at Ellendale and the Hammock at Georgetown.

Lobelia puberula Mx. Georgetown and Ellendale.

Chondrilla juncea L. Smyrna Landing.

Elephantopus nudatus A. Gray. Sandy woods, Georgetown, Rehoboth and Millsboro.

Sclerolepis uniflora (Walt.) Porter. Very common in ditches, Ellendale and the Hammock, Georgetown.

Heterotheca subaxillaris (Lam.) Britt. & Rusby. Millsboro. Very abundant between Georgetown and Laurel. One specimen east of Georgetown.

Boltonia asteroides (L.) L'Her. Ellendale and Georgetown.

Pluchea foetida (L.) B.S.P. One colony in the dune hollows north of Rehoboth.

Coreopsis rosea Nutt. Ellendale, Milford and Rehoboth. Plants smaller than New Jersey specimens.

Senecio tomentosus Mx. Common, Georgetown, Ellendale and Rehoboth.

Carduus Virginianus L. One specimen along roadside east of Georgetown with the *Heterotheca;* perhaps like that plant common further west.

Specimens of all the plants mentioned, except *Carduus Virginianus* L. are deposited in the Herbarium of the Academy of Natural Sciences, Philadelphia.

Girard College.

THE GENERIC NAME WEDELIA

By T. D. A. Cockerell

The receipt of Mr. Standley's admirable revision of the Allionaceae of the United States called up a question as to the propriety of using *Wedelia* as the name of a genus in that family. *Wedelia* Loefl., Iter. Hisp. 180. 1758, is clearly a hyponym, since it includes no named species. According to the Index Kewensis, combinations under *Wedelia* occur in Linn. Syst. ed. 10, 890, but Dr. Barnhart has kindly looked up this reference,

and finds that Linné cites Loefling, but does not so much as mention his generic names. In the meanwhile, *Wedelia* Jacq., Enum. Pl. Carib. **8**: 28. 1760, was proposed for a genus of Compositae which is current to-day, with very many species. *Wedelia* Loefl., Reise 240. 1766, had an assigned type, the *Allionia incarnata* L., but this is several years subsequent to Jacquin's publication.

The type of *Allionia* Loefl., L., Syst. ed. 10, 890. 1361 (1759) is *A. violacea* L., as Mr. Standley states. *Wedelia* Loefl., in the Allioniaceae, is thus left nameless, and *Wedeliella* is herewith proposed. The species, with references to the pages of Mr. Standley's work (Contr. U. S. Nat. Herb. XII, part 8, 331 et seq. 1909) are as follows:

Wedeliella cristata: *Wedelia cristata* Standley, p. 331.

Wedeliella glabra: *Wedelia glabra* (Choisy) Standley, p. 332.

Wedeliella incarnata: *Wedelia incarnata* (L.) Kuntze, Standley, p. 332. Type of genus.

Wedeliella incarnata anodonta: *Wedelia incarnata anodonta* Standley, p. 333.

Wedeliella incarnata villosa: *Wedelia incarnata villosa* Standley, p. 333.

Wedeliella incarnata nudata: *Wedelia incarnata nudata* Standley, p. 334.

I am greatly indebted to Dr. N. L. Britton and Dr. J. H. Barnhart for advice and reference.

REVIEWS

Walton's Wild Flowers and Fruits*

This practical guide to the wild flowers and fruits follows the earlier popular books in arranging the plants in color groups. Much time is saved, however, in finding the name of a plant, by the addition of a series of easy and ingenious chart or diagram keys — one for each color group. These keys are based upon such characters as the manner of growth (climbing, upright, etc.) the flower and leaf arrangement, the number of petals, and the presence of thorns. The keys and the flower descriptions are

* Walton, G. L. Practical Guide to the Wild Flowers and Fruits. 12mo. Pp. 198. 1909. J. B. Lippincott Company, Philadelphia. $1.50.

framed in the simplest language ; the glossary itself contains but sixty-one terms, and among these are included such common words as annual, head, herb, and stamens. About four hundred flowers and one hundred fruits are thus simply described in detail sufficient for identification. Provisions are made for those least learned in botanical terms, and it is possible to trace the flowering dogwood successfully, even if the four large white bracts are considered petals — as they often are by the uninitiated. Sometimes it seems as if this simplified method were carried to the extreme ; the flowering dogwood may again be mentioned here, for the keys do not make it possible to find the name if one uses the true flowers, which are surrounded by these white bracts. Objections might also be made to the use of the word sepals for all the perianth parts of some of the Liliaceae. The illustrations add but little to the value of the book, and some (such as the line drawings of the yellow clover, pine sap, and hobblebush) may prove a hindrance.

Yet, these are after all minor points. The book is by far the easiest, simplest, and quickest guide to wild flowers. It is so simple that a child of twelve can readily learn to use the keys and name the common flowers of his neighborhood. The book must also prove a boon to the many people who are interested in plants and their names, but who do not have the time and the patience to work over the somewhat technical keys of our manuals of botany, and to whom simple and compound pistils, placentae, and hypogynous or inferior insertions are insurmountable difficulties. High school pupils should be introduced to this popular key, for it may prove the long-desired connection between the work of the school room and a lasting interest in botany.

Jean Broadhurst.

PROCEEDINGS OF THE CLUB

May 26, 1909

This meeting was held at the museum of the New York Botanical Garden and was called to order at 3 : 30 P. M. by President Rusby. Thirty-four persons were present. After the reading and approval of the minutes of the preceding meeting,

the scientific program was presented, the first contribution being made by the president, Dr. H. H. Rusby, who spoke on "The Earliest Spring Flowers in the Vicinity of Charleston, South Carolina."

The speaker's remarks were based on observations made between March 16 and March 23 at Summerville, which is about twenty-two miles northwest of Charleston. This town is located upon a ridge, said to be of limestone and elevated only a few feet above the surrounding flats. Most of the country about is covered with pine timber, but there are numerous low swampy places filled with dense thickets formed of various trees, shrubs, and vines. There is also considerable deciduous forest growth intermingled with the pines. By a careful comparison of the state of vegetation there in March with that of New York and vicinity in May, it was concluded that there was a difference of eight or nine weeks this year in the progress of the season, though it is probable that in an ordinary year the difference would be about seven or eight weeks.

Summerville is noted for the existence there of Dr. Shepard's tea-gardens, the only tea plantation conducted on a commercial scale in this country. There are now about 100 acres of plantation in productive operation there, from which 12,000 to 15,000 pounds of tea are sold annually. Success has been obtained through an extensive series of experiments with all the known varieties of the tea plant. No attempt is made to compete with the Orient in the cheaper grades of tea but in the more highly prized grades, the Summerville product is already taking a leading rank.

The plants collected were discussed and exhibited in groups, the first comprising the earliest-flowering kinds. The yellow jessamine (*Gelsemium*) was everywhere abundant, forming thickets difficult of penetration and loading the air with fragrance. Growing with it were several species of *Smilax*, then sending up their young crisp shoots, which are there known as "wild asparagus" and are said to be used as a substitute for that vegetable. They have large tuberous rhizomes, collectively known as "bamboo brier." Some of the more fleshy starchy kinds of these tuberous

rootstocks were used as food by the Indians. One of the early-flowering plants was a bloodroot, segregated by Professor Greene from its northern ally as *Sanguinaria australis*. *Hexastylis arifolia* was rather common on sandy slopes. The close-creeping *Rubus trivialis* grows everywhere along the roadsides, with its handsome large flowers scarcely elevated above the low grass. Two strikingly different Houstonias occur, *H. minor*, which closely resembles *H. caerulea*, and *H. rotundifolia*, which has the habit of *Veronica officinalis*. *Thyrsanthema semiflosculare* (*Chaptalia tomentosa*) was of peculiar interest to the speaker on account of its resemblance to related species which he had collected in tropical America. *Pinguicula lutea* is common on partly shaded wet sand. In similar, though drier places, grew the yellow-flowered *Chrysogonum virginianum*.

The second group of plants discussed included those inhabiting low sandy grounds which are perhaps technically swamps, though usually dry. The most interesting of these plants is the at length climbing and extremely variable *Viorna crispa*, with its beautiful nearly white or light blue somewhat fragrant flowers. Several handsome shrubs are found in this association and also an *Oxalis*, which is apparently *O. Martiana*.

The aquatic and semi-aquatic plants observed included, in part, *Ranunculus hispidus*, *Senecio lobatus*, *Callitriche heterophylla*, *Cardamine pennsylvanica*, and *Sarracenia flava*. The last is abundant in open grassy swamps and gives them a yellow hue when in full bloom.

The shrubs and trees of the region included *Malus coronaria*, always growing singly in swamps, *Amelanchier Botryapium*, *Aronia arbutifolia*, *Ilex glabra*, *Ilex decidua*, and a great abundance of *Myrica cerifera* of very large size. *Viburnum obovatum*, often seen near streams, is known locally as the "possum haw." *Viburnum cassinoides* and *Azalea canescens* were also observed. *Symplocos tinctoria* is very different in habit from the tropical representatives of the genus. A very handsome juniper, of low, broad, cypress-like habit, is perhaps *Juniperus barbadensis*. Doubtless the two most elegant shrubs of the swamps were *Leucothoe axillaris* and *Pieris nitida*, both of which grow in dense clumps,

and have dark heavy foliage and an abundance of waxy white flowers. *Vaccinium australe* takes the place there of our *V. corymbosum* and closely resembles that species. Another species, probably *V. tenellum*, was in flower at the time, as were two species of *Prunus*.

Other plants collected were *Silene caroliniana*, *Podophyllum peltatum*, *Linaria canadensis*, and a peculiar and abundant *Trillium*, which is possibly *T. ludovicianum*, though far out of its recorded range, if really belonging with this species.

Dr. Britton, in discussing Dr. Rusby's paper, referred to the popular belief among the fruit-growers of Delaware that the spring advances northward at the rate of thirteen miles a day — a belief that would seem to be supported by Dr. Rusby's observation that there is a difference of seven or eight weeks in the progress of the season between Summerville and New York City.

The second paper on the scientific program was by Dr. J. A. Shafer on "Botanizing in Cuba." The following summary is from an abstract prepared by Dr. Shafer:

"I was landed from a New York steamer at Nuevitas on January 22, and arrived at La Gloria, my first headquarters, late the following evening.

"A chain of islands extends along the north coast of Cuba, from Nuevitas to Cardenas, separated from the mainland by a series of bays and channels forming an inner passage for small sailing craft. Through some sixty-five miles of this one passes mangrove-fringed shores before reaching Port Biaro.

"La Gloria, one of the oldest and most prosperous of the American colonies, is situated four and one-half miles inland from the port above mentioned, across a low palmetto-covered savanna. The village with its surrounding citrus plantations, is situated in a dense, mostly primeval forest composed of a great variety of tropical trees, their tops bound together with many kinds of woody vines and supporting on their trunks and branches many orchids, of which some fifteen or eighteen species were collected — also bromeliads in great numbers and of several varieties; two cactuses are ever present, a creeping snake-like night-blooming *Cereus* and the graceful pendent *Rhipsalis*, called

by the colonists "mistletoe." Undershrubs and ferns are few in number and variety, and herbaceous plants are scarce. This wooded region, of very low altitude, here extends about one-fourth of the way across the north and south axis of the island and is separated from the barren, palm-covered savanna to the south by a ridge of limestone hills, known as Sierra Cubitas. The Cubitas Mountains, as these hills are called by the Americans, were visited and the mouth of a grand cavern in the eastern part afforded an ideal place for camping. The hilltops are clothed with about the same species of trees that comprise the forest of the fertile lowlands but they are stunted and less numerous and one at first wonders how any plants could grow on this perforated rock. Epiphytes were less numerous but bromeliads were sufficiently abundant to be used as fodder for our horses in the total absence of suitable grasses. Several depressions, called passes, which in the rainy season are water-courses, are especially interesting, being rich in ferns, peperomias, and various other shade-loving plants.

"One of the objects of this expedition was to ascertain whether the flora of northeastern Cuba had any relation to that of the adjoining Bahamas, which islands have been the subject of extensive floristic investigations by Dr. Britton and others; but in the region just described there seems to be little or no relationship.

"Cayo Guajaba, one of the chain of islands already referred to, none of which seem to have been visited by botanists heretofore, probably on account of the difficulty of access, was examined at several points and was found to possess a very different flora from that of the mainland south of it, many of the species being Bahamian. This island is about fifteen miles long, nearly half as wide, of a limestone formation, and rather rough, its hills probably reaching an altitude of two hundred feet. It is uninhabited save by billions of insects and some wild hogs and deer; a drove of wild horses also is said to exist there, as there is considerable grass upon the island.

"Cayo Sabinal, the largest and easternmost of these islands, appears on some maps as a peninsula; at the present time it is separated by a narrow artificial canal, but its southern side is

made up of a series of mangrove islets, which in dry seasons are separated only by salinas. The higher northern portion is of a flat limestone formation, the inner portion covered by a forest of small trees, largely pigeon plum, *Coccolobis laurifolia* Jacq. Poison wood (*Metopium Metopium*) is also very abundant. Interior salinas, which are irregular in outline and of various extent, are usually fringed with *Conocarpus*, much of which is arborescent. Other openings, of red soil, are largely made up of cat's-claw, *Pithecolobium*, and toward the westerly end some very regularly outlined openings, varying from a few feet in diameter to several acres in extent and often containing a pool of fresh water, are occupied almost entirely by large palmettos; still other openings, small but deeper, support pond-apple, *Anona*, which trees, when the water has subsided sufficiently to expose their short thick trunks, are very grotesque in appearance. At a place near the center of the island large numbers of *Fuscraea* were observed in the dense forest; a thick columnar cactus, often twelve feet high and probably a *Cephalocereus*, was frequently seen but never in large numbers. Several species of palm occurred frequently but no royal palms were seen on any of these islands. The Sabinal was reached from Nuevitas, at which headquarters were made for several weeks, with the aid of an open sail boat, in which two- or three-day trips were taken.

"North of Nuevitas, the railroad to Camagüey passes through many miles of barren palm-covered savannas, through which an occasional stream passes, whose winding course can readily be made out by the fringe of green trees, overtopped by the graceful heads of the royal palm. From Camagüey to Holguin, a distance of about one hundred and fifty miles, one passes alternately through stretches of dry savannas, rich dense woods, or fertile pastures.

"Holguin, of historic as well as commercial importance, is a typical Cuban city of the better type. It is situated on a plateau encircled by a series of irregular mountains of eruptive rock, much burnt over, red and barren to look upon, but when they are examined it is found that the gullies and rocky places are clothed with dense masses of low spiny shrubs, in great variety

and unlike most of the things seen in the regions already mentioned. A pretty palm, seen only on these hills, is at times very conspicuous, as is also a columnar cactus ; and an *Agave* often occupies the summits. Singularly enough, the largest of the very few trees met with on these hills was a single specimen of mahogany. The surrounding region for several miles is a rocky savanna or palm barren in which but one species of palm, a *Copernicia*, is very abundant. Many of the shrubs of the mountain-sides occur here also and the frequent springs, rich swales, and resultant streamlets are occupied or surrounded by groups of trees, shrubs, and some herbaceous plants not seen elsewhere ; these pass on and join broader river valleys, covered with rich woods, royal palm groves or fertile plantations. Flanking these eruptive formations are several series of limestone hills, the intervening valleys being fertile woodland or barren palm-covered savannas.

" Gibara on the coast north of Holguin was visited and the mouth of the bay examined. The flora here as a whole is similar to that of other localities of a like nature, but as in the case of all the others it was found to have some prominent element not seen elsewhere. Here the tall slender stalks of *Papaya Carica* were very peculiar, their small leafy tops high above the surrounding scrub, among which it was sparingly scattered, giving it very much the appearance of tall slender palms noted elsewhere.

" Cacocum and Alto Cedro, stations on the Cuba railway, were given a hurried examination.

" Paoso Estancia, toward Santiago on the Cauto River, was made the last place from which extensive explorations were carried on. The river, which is the largest in Cuba, here passes between high bluffs made up of stratified limestone and clay or sand. It has many turns, with gravelly bars and sandy or muddy banks, and many things can be found here. The surrounding country is a dense forest with a great variety of species ; from here, too, one can see the pine-covered tops of the Sierra Nipe, and an interesting but rough region of some fifteen miles is traversed in getting to them. Much of it is a dense forest of very

large timber; in all of it is a region in which much of value could be found were sufficient time devoted to it, but my time now was limited and only the Pinales of the mountain tops were given consideration. The pine trees are scattered over a very red earth, said to be good iron ore, and often reach a height of seventy-five feet or more, with trunks two feet in diameter. Among them are a number of peculiar shrubs and a small tree of the huckleberry family, not seen elsewhere. The wiry grass is frequently burnt over, making small herbaceous species, if there were any, seem very scarce.

"Antilla, the new seaport, was reached on the afternoon of the fourth of May, and the next day I crossed to the village of Sartia, situated on the inner east side of the narrow channel to the ocean where a little collecting was done; the next morning both sides of the channel were explored for some distance around the ocean end of both shores. On the western shore I was fortunate in finding several specimens of the large tree cactus already secured by Dr. Britton on the south coast of Cuba. One of them was fully twenty-five feet high with an equal spread, its spiny trunk having a diameter of two feet."

After a discussion of Dr. Shafer's paper by Dr. and Mrs. Britton, Dr. Rusby, and others, adjournment followed.

MARSHALL A. HOWE,
Secretary pro tem.

NOTICE FROM THE FIELD COMMITTEE

Members are urged to verify for themselves the times of departure of the trains given in the circular of meetings for July and August. On July 17, when an excursion to Pocantico Hills was held the time of departure was ten minutes earlier than the advertised time, owing to a recent change in the time-table. Members intending to go on the Belmar trip will have to be guided by any change the railroad company may make in the time-table. If there is any change, the party will take the train that leaves as near as possible to the time advertised in the field meeting circular.

NORMAN TAYLOR,
Chairman.

NEWS ITEMS

Joseph E. Kirkwood, Ph.D., Columbia, 1903, has been appointed assistant professor of forestry and botany in the University of Montana. He was formerly professor of botany in Syracuse University and for a time a botanical investigator for the Continental-Mexican Rubber Company.

Mr. William T. Horne, who was fellow in botany in Columbia University in 1903–'04, has resigned his position as chief of the department of plant pathology of the Cuban Agricultural Experiment Station and has accepted an appointment as assistant professor of plant pathology in the University of California.

Tropical Life announces a prize of fifty pounds sterling for an essay embodying research work directed towards ascertaining exactly what changes (together with their causes and whether these changes occur during the fermentation process only or while being dried) take place in the cacao bean between the time that it leaves the pod until it is shoveled into the bag for export. For further information those interested may address the editor of *Tropical Life*, 112 Fenchurch St., E. C. London.

The joint field meeting of the Vermont Botanical and Bird Clubs was held July 6 and 7, with headquarters at Burlington. The sessions were planned to fit in between the two most important days of the Champlain Tercentenary Celebration. The first day was occupied with an excursion to Ausable Chasm, New York. In the evening a short business meeting was held in the Museum of the University of Vermont. Wednesday morning the party went by trolley to Ethan Allen Park, then tramped through the woods down to Eagle Bay, and along the lake shore back to Burlington. In the afternoon, the party, somewhat reduced in number, visited the very interesting High Bridge region, and the *Woodwardia* pond at Fort Ethan Allen, Colchester. Both days were cool, and such unusual July weather contributed much to the enjoyment of the forty persons in attendance.

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THE RUBBER PLANTS OF MEXICO*

By H. H. Rusby

Until within a few years, there was but a single known source of commercial rubber in the entire republic of Mexico. Now two species are contributing regular supplies, and a third, to be specially considered here, is likely soon to become a very important factor in this industry. Mexico thus becomes one of the most important of the world's rubber-producing countries.

That other sources remain to be developed is very certain, since the families Euphorbiaceae, Moraceae, and Apocynaceae, which comprise most of the rubber-yielding plants, are abundantly represented in the Mexican flora. The same may be said of the Sapotaceae, the family that yields gutta percha, chicle, and balata.

The first of the rubber-producing plants mentioned above is *Castilla elastica*, the Central American rubber tree known also as the Mexican rubber tree or "hule," in all but recent literature. So abundant is this tree in one locality, that it and its railroad station are known as El Hule. This tree also yields rubber in the West Indian Islands. It is a near relative of the *Ficus*, yielding the East Indian rubber, to which its product bears considerable resemblance. On the other hand, it is not related to the *Hevea*, which yields the superior Para or Amazon rubber. The *Castilla* becomes a large tree, some authors state up to six feet in diameter, and lives to a great age. Owing to the destructive methods of collecting its latex, the exportation of Mexican rubber declined from $160,000 in 1882–3 to $47,000 ten years later, and the government was faced with what threatened to be

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* Abstract of a lecture delivered before the Torrey Club, February 9, 1909. Illustrated with the aid of the Catherine McManes fund.

the practical extermination of the tree. It therefore not only established rules for the method of collection, but offered a handsome subsidy for the planting of the trees. This is one of the most satisfactory of rubber trees for cultivation. It grows well

Collecting milk from a tree that bears more than 40 wounds from previous collections.

up to an altitude of 1,500 feet and requires a well-distributed rainfall of at least 100 inches, and good drainage. The seeds must be planted very soon after collection, as they do not long retain their vitality. At one year old the tree is about three feet

high, and collection can commence when it is from five to seven years of age. Although a number of trees can often be found in proximity, the species can by no means be classed as gregarious. The milk, after collection, must be coagulated artificially. This is mostly accomplished by boiling in water, which causes the rubber to separate as a superficial crust; it is then dried and hardened by rolling. The same result is sometimes obtained by merely mixing the milk with water and allowing it to stand. Sea water acts much better than fresh water. Sometimes the coagulation is accomplished by means of adding citric or sulphuric acid. The yield of rubber is nearly one half of the weight of the latex, and the rubber is of only medium quality.

The second variety of rubber to be considered is produced in a region where all the conditions are opposed to those of the well-watered *Castilla* region, namely, the high and dry table-land of the northwestern district. Owing to the high degree of radiation, this region differs also in being subject to a great variation of temperature by day and night, respectively, yet it can be regarded as a hot district. During midday the heat is often extreme. It is excessively dry, the amount of rainfall, even in the short rainy season, being but moderate. Except for some large yuccas, and a few leafless species, trees are almost wanting, and the shrubs are mostly low and stunted. Among these shrubs occurs one which has been described before in TORREYA, namely, *Parthenium argentatum*; it is an important rubber-yielder, and therefore called "guayule," the Indian equivalent for "wild rubber." It is a low shrub of some two or three feet in height, of robust and densely branching habit, and somewhat gregarious. The stem is rarely so thick as the wrist and branches from the base, the branches being rather short and stout. This shrub is of very slow growth, requiring probably forty or fifty years to reach its full size. It is as yet too little known to enable us to say how many years it must grow before it will yield sufficient rubber to be worth harvesting, but this is believed to require fifteen years or more. Little is known about its natural methods of reproduction, but it appears to propagate sparingly, in the desert, from seeds. The prospects for a new crop of rubber within a human

generation, when all the shrubs of a district have been uprooted, are therefore very poor. Advantage has been taken of this peculiarity by those engaged in exploiting it, to bring about a monop-

Examining a tree that has been improperly cut. (Dr. Rusby at the left, Dr. Altamirano, Director Nat. Med. Institute of Mexico, at right.)

oly. Having purchased all the most important guayule lands, they offered to purchase the shrubs collected from the outlying districts. The price, at first $10 per ton, has been advanced to

$130, a price so high as to tempt the collectors to uproot it, a process which is certain to exterminate it except on the company's own lands.

When it was first suggested that rubber could be obtained from this shrub, a member of the daisy family, the greatest incredulity was encountered, and the enlisting of capital in the enterprise was a matter of extreme difficulty. At present, the total capitalization of the interests engaged in this enterprise is said to be about $130,000,000, and there is every prospect that even on this great scale, the business will be very profitable.

The collection of this variety is by a method unknown elsewhere in the rubber industry. By it the entire woody portion of the plant is finely ground, and the rubber extracted by liquids from the dust.

The third, and what we may call the new variety of Mexican rubber, is also unique as to its character, and the methods employed in preparing it. It is produced by the *Euphorbia elastica*, and is therefore a near relative of the Para rubber.

This tree inhabits a region intermediate in location and climatic character between those producing the two previously described varieties, namely, the hilly country where the western edge of the table-land breaks down into the coast slope, at an altitude mostly of from 5,000 to 7,000 feet. The climate of this region might be called subtropical. The banana and orange grow here, but only exceptionally produce fruit. Some poor apples are grown and corn is the staple agricultural product. Although there is a long dry season, the rainy season is long enough, and its rains abundant enough, to produce the crops without irrigation, for the most part.

This *Euphorbia* will not grow on the alluvial plains, but only on the rough rocky hillsides, where the drainage is good. Its arborescent associates are Randias, Acacias, Convolvuli, and a number of Cactaceae. It is a gregarious species, the branches often interarching over considerable areas, although many smaller trees and shrubs are intermingled. It is a rather small tree, the trunks usually less than two feet in diameter, and the height usually under fifty feet. Its branches and branchlets are rather

few and massive, there being a dearth of fine twigs. It is therefore not very leafy and does not afford much shade. The leaves are mostly crowded at the ends of the branchlets, and are oblong, thick and smooth, and about six inches in length by one to one

A thick growth of Palo Amarillo trees, about 40 to the acre.

and a half in breadth. The bark is thick and rather succulent, at first smooth and of a light or yellowish green color. That of the trunk and large branches soon exfoliates in large, very thin, papery, translucent sheets of an orange-yellow or orange-red

color, which impart a shaggy appearance, and a color that has given the tree its vernacular name "palo amarillo," or yellow trunk, which becomes also the commercial name of this variety of rubber. The flowers appear in January, or there-about, before the appearance of the new leaves, and the fruits mature in June and July. The seeds, which are much like those of the castor-oil, contain about 50 per cent. of a fatty oil, which can be pressed out, and is good for soap-making.

As soon as the bark is wounded, a milky juice exudes which is very irritant and capable of producing violent inflammation of the eyes if it enters them, as it is quite liable to do in spattering when the tree is cut. A part of this latex soon coagulates, but the coagulum is soft and curdy, rather than tough and elastic, like that of most rubber milks. Rather more than half of it does not coagulate at all, except as a result of drying out. The coagulated portion contains the rubber, about ten per cent. of the entire weight, but with it there is more than twice as much resin. It is this intimate mixture of resin with the rubber that compels a resort to different processes for the manufacture of this rubber from those which apply elsewhere in the rubber industry. The separation has to be effected by solvents, and by the aid of special machinery. Nevertheless, the cost is inconsiderable, and the business bids fair to be very profitable.

The great value of this tree as a rubber-producer lies in its abundance over large areas, and the proximity of the trees to one another, facilitating collection of the milk, as well as the ease with which it can be propagated, and the rapidity of its growth. All that is necessary for propagation is to thrust the newly cut branches into the soil, where they practicallly all grow. From them the tree reaches its full size in from five to seven years. These considerations appear to justify the opinion that if all other sources of rubber were to fail, this one could probably supply the world's entire requirements.

It may be added that this and several similar species form a peculiar division of the genus which will in all probability be elevated to generic rank. It is said that one known as the "palo colorado," or red trunk, growing in the northern part of

the palo amarillo region, and mingled with the latter species, is probably another member of this group.

The properties of the palo amarillo rubber are peculiar. Taken by itself it is of only medium quality, but mixed in suitable proportion with other varieties, especially with Para rubber, it markedly improves them.

TWO NEW FOSSIL PLANTS FROM FLORISSANT, COLORADO*

By T. D. A. Cockerell

Polypodiaceae

Hypolepis coloradensis n. sp.

Pinnules about 2 ½ mm. long, oblong or obtusely subtriangular, connected basally, and bearing two to four large round marginal sori, which as preserved are very dark in color. In general structure and appearance, the plant closely resembles *Hypolepis repens* (L.) Presl, as figured by Shimek in Bull. Lab. Nat. Hist. Univ. Iowa, IV (1897), pl. v, f. 4. The more usual forms of *Hypolepis* have only one or two sori to the pinnule, but no doubt the earlier condition is one in which they are numerous, as in *Adiantum*.

Habitat. — Miocene shales of Florissant, Station 14; fragments only. The genus is to-day common in the West Indies and Central America.

Caesalpiniaceae

Bauhinia pseudocotyledon n. sp.

Leaf circular in outline, or nearly so, 16 mm. long and 18 broad, as preserved dark in color, apparently thick; the median sinus about 6 mm. long, its sides, except apically, very close together; venation indistinct, but with a lens it is possible to see clearly a mid-vein running to the sinus, and two strong laterals, as shown in the figure; petiole short, about 2 mm., twisted to one side. From its dark color, apparent thickness, and obscure venation, I thought at first that this was a cotyledon, probably of *Ipomoea*, possibly of some Sterculiaceous plant related to *Pentapetes*. A closer scrutiny shows, however, that the venation will not accord with these. In the seedlings there appears to be

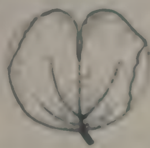
* Illustrated with the aid of the Catherine McManes fund.

morphologically no mid-vein, and when one is present it consists of the two inner laterals united, which diverge before reaching the sinus. All this is quite different from the condition in *Bauhinia*, with which the fossil accords.

Habitat. — Miocene shales of Florissant, 1908. The genus occurs as far back as the Cretaceous (cf. Berry, Torreya 8: 218).

I have sometimes remarked on the absence of Neotropical elements in the Florissant shales. The two plants now described

Hypolepis coloradensis Ckll.



Bauhinia pseudocotyledon Ckll.

are apparent exceptions to this, but I believe that they did not invade North America from the south, but belong to a flora which formerly flourished in the north, and has now been pushed southward by changes in the climate. What I mean when I speak of the absence of Neotropical elements at Florissant, is that I do not find genera or families which there is reason to believe *originated* in South America. Dr. Knowlton, in his interesting discussion of the Tertiary flora of the Yellowstone (Monog. U. S. Geol. Surv. XXXII, pt. 2, p. 778) remarks that "the Tertiary flora appears to have originated in the south, while the present flora is evidently of more northern origin." I think that on the contrary, there is much reason for thinking that the Tertiary flora originated in the north, and has (so far as it has survived), to a considerable extent, since *travelled south*. (For a discussion of the same question as applied to animals, see *Nature*, Aug. 6, 1908, p. 318.)

University of Colorado

ADDITIONS TO THE FLORA OF THE BLACK HILLS OF SOUTH DAKOTA

By Stephen Sargent Visher

During the first half of August, 1908, a collection of about three hundred species of the ferns and flowering plants of the northern Black Hills was made for the State Museum. Upon reference to Saunders' Ferns and Flowering Plants of South Dakota[1] and to Rydberg's Flora of the Black Hills[2], it is believed that some eight species are new to the state; some eight additional new to the Hills, though known from the eastern part of the state; five are recorded from the northern part of the Hills for the first time, though they were collected near Custer in the southern part; and five more rare species are mentioned from new localities in the hills. In the list the species believed to be new to the state are indicated by an asterisk, those known from other parts of the state are followed by (eastern) if from the eastern part, or by (Custer), (Lead), etc., if from other localities in the Hills.

The collection was identified with the kind assistance of Dr. J. M. Greenman at the Field Museum of Natural History, Chicago.

Woodsia scopulina D. C. Eaton. Rocky Mountain Woodsia.

This fern was found to be quite abundant in protected niches in rocks near Roubaix. (Rare in Black Hills.)

Pteris aquilina L. Bracken fern.

Locally abundant in woods on Custer's Peak. (Custer.)

Eleocharis intermedia (Muhl.) Schultes. Matted spike-rush.

Common on moist ground near Rapid City. (Eastern.)

* *Scirpus Torreyi* Olney. Torrey's bullrush.

Common in marsh near Roubiax.

* *Juncus balticus* Willd. Baltic rush.

Rare, Rapid City.

* *Juncus acuminatus* Michx. Rush.

Rare, in marsh, Rapid City.

[1] D. A. Saunders, Bulletin 64, U. S. Experiment Station, South Dakota.

[2] P. A. Rydberg, Contrib. U. S. Nat. Herb. 3: 463-536. *pl. 17-20.* 1896.

Juncus xiphioides montanus Engelm.

Found in Spearfish Canyon. (Custer.)

* *Salix Scouleriana* Barrett. Scouler willow.

Frequent, forming trees, in deep woods, well up on Custer's Peak.

* *Alsine longipes laeta* Watson.

On hills south of Rapid City.

Sanguinaria canadensis L. Bloodroot.

Abundant in the shady gulches near Whitewood. (Northeastern.)

Melilotus alba Desr. White clover.

M. officinalis (L.) Lam. Sweet clover.

Both of these clovers are now extensively naturalized near Rapid. (Eastern.)

Hedysarum americanum (Michx.) Britton. Hedysarum.

Also near Roubaix. (Rockford.)

* *Ceanothus ovatus* Desf. Oval-leaved red-root.

Abundant in woods near Whitewood. Although this and the next are recorded by Rydberg, they are not included in the catalogue.

Vitis vulpina L. Riverside grape.

Common near Roubaix. (Eastern.)

Malva rotundifolia L. Cheese mallow.

Naturalized near Rapid City. (Eastern.)

Viola arenaria DC. Sand violet.

Abundant on rocks near Bucks and in Spearfish Canyon. (Rapid.)

Pastinaca sativa L. Wild parsnip.

Escaped in Box-elder Canyon. (Rapid.)

Pyrola rotundifolia L. Round-leaved wintergreen.

In wooded ravines near Whitewood. (Lead.)

Pterospora andromedea Nutt. Pine drops.

Abundant in woods on Custer's Peak and in Spearfish Canyon. (Rapid.)

Dodecatheon Meadia pauciflorum Durand. Shooting star.

Rare, on hills. Rapid City. (Custer.)

Stachys aspera Michx. Rough hedge nettle.

On moist ground in Box-elder Canyon. (Custer.)

Mimulus luteus L. Yellow monkey-flower.

Abundant on a springy slope in Elk Canyon. (Lead.)

Symphoricarpos occidentalis Hook. Wolfberry.

Frequent along Box-elder Creek, on plain near Underwood. (Eastern.)

* *Lonicera utahensis* Watson. Low honeysuckle.

Rare, on deep cool woods in Elk Canyon near Runkle.

Sicyos angulatus L. Burr cucumber.

In thickets along Rapid Creek near Rapid. (Eastern.)

Erigeron annuus (L.) Pers. Sweet scabious.

Common in "Red Valley" near Blackhawk. (Eastern.)

* *Arnica pumila* Rydberg.

Fairly common on dry slopes west of Rapid City and near Mystic.

CARNEGIE LABORATORY, TUCSON, ARIZONA

THE 1909 SYMPOSIUM AT STAMFORD, NEW YORK

From the point of view of the specimen hunter, the symposium held this year at Stamford, Delaware County, July 3–10, will not be considered a successful event as the number of "rare finds" readily accessible was scanty. From the view-point of those interested in ecologic and phytogeographical problems the week spent in the mountains will be remembered with pleasure.

Generally speaking the area covered during the week is the northwestern outpost of that part of the Catskills which lies within the range prescribed by the club's preliminary catalog of 1888. The town itself is about 1,800 feet above sea-level, and it is nestled in a natural basin. The depression is fringed with mountains, the highest of which is Mt. Utsayantha, credited with an elevation of 3,365 feet. Within three miles of the town the headwaters of the western branch of the Delaware river take their origin, and as it runs through the town the stream is scarcely more than a tiny brook. In this same height of land, but flowing in the opposite direction, the headwaters of Schoharie creek originate. This ultimately flows into the Hudson, via the Mohawk.

The club herbarium contains practically no material from Del-

aware County. And the percentage of plants which may be expected to grow in this region and do not, and those which grow contrary to expectation, is wholly conjectural. During the week spent in the area, and through the kind coöperation of the members attending the meeting a collection of the flowering plants was secured which may be considered fairly representative of the flora at that time. Dr. Philip Dowell did much discriminating in the collection of hybrid ferns, and as the country about Stamford is particularly rich in these interesting plants, much valuable information on the subject will be preserved as a permanent record.

It is not possible at this time to publish the determinations of the plants collected during the week, but following out the notice printed in TORREYA for June, whatever of special interest may turn up in the collection will be commented upon later. There was a rather slender attendance at the symposium.

NORMAN TAYLOR

NEW YORK BOTANICAL GARDEN

OUR CITY PARKS IN THE HUDSON-FULTON CELEBRATION

THE BOTANICAL GARDEN, BRONX PARK *

In coöperation with the Hudson-Fulton Celebration Commission, specimens of all the native trees of the Hudson River Valley growing in the grounds of the New York Botanical Garden will be marked temporarily with a large letter "H." Inasmuch as nearly all the wild trees of the valley are growing within the grounds, either wild there, or planted in the arboretum and along the driveways, this illustration of the trees which might have been seen by Hudson and his company in 1609 will be nearly complete. While the number of individuals of most kinds in the Hudson Valley has been greatly reduced by clearing land for cultivation and by lumbering operations, it is not likely that any species native to the valley has been exterminated within its bounds.

* Reprinted by permission from the *Journal of the New York Botanical Garden* for August, 1909.

Another feature will be a Guide Book to the grounds, buildings and collections of the Garden to which will be appended a descriptive list of the native trees of the Hudson River Valley written by Mr. Norman Taylor, an assistant curator; this list will give a short popular account of each of the kinds of trees and a number of them will be illustrated by reproductions of photographs. This document will be issued as a Bulletin of the Garden and distributed to all members and to all institutions with which the Garden has exchange arrangements.

The question has been asked if any of the large trees of the Hudson River Valley were in existence in 1609. The most likely illustrations of this are the large white oaks (*Quercus alba*) which are found in many places, some of them approximating four feet in trunk diameter, or perhaps even larger. The slow growth of this tree after its first hundred years of life would make it probable that some of these monsters were at least saplings before the end of the sixteenth century. The average increase in diameter of the white oak as calculated from the thickness of annual wood rings of trees cut on Staten Island some years ago, is 0.18 inch up to the age of 47 years. Subsequently, the layer of wood annually laid on is much thinner. Observations on the largest white oak within the grounds of the Garden, growing in the woods south of the Museum Building along the path leading to the waterfall near a cluster of sweet birches show that its circumference, measured July 30, 1909, at four feet above the ground, is 11 feet and 2 inches; its diameter is, therefore, about 42½ inches and its radius 24¼ inches; allowing for the thickness of the bark the radius of wood is about 20 inches. A little piece was taken out from the side of this tree with a sharp chisel and the wound made carefully covered with tar. The number of wood layers to the inch as revealed by this experiment is 16, the average thickness of the layers being thus 0.062 inch. From these observations and other data it is estimated that the average thickness of the annual wood layer of the white oak in trunks up to 42½ inches in diameter is approximately 0.09 inch, which would indicate that this individual tree is about 220 years old. It would, therefore, seem that white oaks with a wood-radius of from 25 to 27 inches would be 300 years old.

A third feature of the cooperation will be an illustrated lecture on the native trees of the Hudson River Valley to be delivered at the Museum Building of the Garden on the afternoon of Saturday, October 30, at four o'clock.

N. L. Britton

BOROUGHS OF BROOKLYN AND QUEENS*

Through the courtesy of Commissioner Michael J. Kennedy, the different species of trees have been labeled in Prospect Park, from the Plaza to the Willink Entrance; in Bedford Park; in Highland Park, and in Tompkins Park. An additional small enameled sign has been hung on those labeled trees that were indigenous to the Hudson River Valley in 1609. The special label reads: "This species is a native of the Hudson River Valley."

TORREY BOTANICAL CLUB FIELD MEETINGS

The field committee will hold no meetings on September 25 or October 2, on account of the Hudson-Fulton Celebration.

October 9. — Special excursion for fungi. — Party will meet at museum building of the Botanical Garden at 2 p. m., where they will be met by the guide, Dr. W. A. Murrill.

October 16, Fort Lee to Hackensack, N. J. — Party will meet at the west 130th Street Ferry at 3 p. m. Return as desired. Guide, Miss Broadhurst. Cost of trip, 20 cents.

October 23. — Special excursion for fungi. Party will meet at the Jerome Avenue entrance to Woodlawn Cemetery at 2 p. m., where they will be met by the guide, Mr. F. J. Seaver. Cost of trip, about 20 cents.

October 30, Wingdale, N. Y. — Train leaves Lexington Avenue Station (N. Y. Central, Harlem Division), at 8:52 a. m. Returning train leaves at 4:36 p. m. Bring lunch. Cost of trip, $3.25. Guide, Mr. Taylor.

* Reprinted from the announcement prepared by the committee on science, history and art of the Hudson-Fulton celebration commission.

Note. — Members are urged to verify times of departure of trains owing to possible changes in time-tables. The excursion on October 30 will be the last of the season.

THE FIELD COMMITTEE,
NORMAN TAYLOR, Chairman

OF INTEREST TO TEACHERS

INSTRUCTIONS FOR RECORDING OBSERVATIONS ON FOREST TREES

Under the direction of the chief forester, Mr. Pinchot, the government Forest Service has issued a leaflet of instructions for recording observations on the leafing, flowering, and fruiting of forest trees. A sample sheet (form 416) is reproduced below. These are obtainable at the forestry department and should appeal to many now occupied in a desultory observation of the seasonal changes. In the schools, the flower, leaf, and fruit charts and records kept by some teachers would gain an added interest if these sheets were used, and the pupils knew of the government's recognition of the practical value of such work.

Form 416.

SPECIES ....

Period covered by observations..

Name of observer..

Residence..
(State) (County) (Town)

General character of country. — *Mountains ; foothills ; plains ; river valley; seacoast.*

Situation of trees. — *Level ; slope* (*north, east, west, south*) *; hilltop ; river bottom ; soil* (*sandy, clayey, heavy, light, deep, shallow, moist, dry*).

(Please check the words which apply to your particular locality and to the trees observed.)

Approximate elevation above sea level ....

Location of nearest Weather Bureau station..

State if season was wet or dry, early or late, etc. ....

	Date		Date
1. *Swelling of buds*		8. *Beginning of leaf falling*	
2. *Bursting of buds*		9. *Ending of leaf falling*	
3. *Beginning of leafing out*		10. *Beginning of seed ripening*	
4. *General leafing out*		11. *General seed ripening*	
5. *Beginning of blossoming*		12. *Beginning of seed falling*	
6. *General blossoming*		13. *General seed falling*	
7. *Change in color of foliage*			

14. *Quantity of seed* __________

15. *Quality of seed* __________

General remarks __________

Professor W. W. Rowlee of Cornell University has been appointed chief examiner in botany on the college entrance examination board for next year.

A large collection of desert plants is still on exhibition in front of the main entrance to the Bronx Park conservatories. Those who have not yet seen this unusual garden will be surprised at the brilliant flowers exhibited by some of the plants. One of the so-called "century-plants" is also in bloom, bearing a flower stalk nearly twenty feet tall.

NEWS ITEMS

Dr. N. L. Britton left New York August 18 on the *Lusitania*, for a short visit to England.

Mr. W. W. Eggleston has recently completed a month's collecting trip in western Kentucky.

Georgia has appropriated $10,000 for educational work at farmers' institutes in the state.

A new agricultural college and research institute has been opened at Coimbatore in British India.

John Putnam Helyar (B.S. Vermont, 1909) has been appointed instructor in botany in the University of Vermont.

Dr. W. A. Murrill of the New York Botanical Garden spent July collecting mushrooms in Virginia.

Professor Winthrop John VanLeuven Osterhout (A.B. Brown, 1893; Ph.D. California, 1899), of the University of California, has accepted a call to Harvard as assistant professor of botany.

Professor Emil Hansen, the physiological botanist, died in August, at the age of sixty-seven. Professor Hansen was best known for his work on microörganisms and alcoholic ferments.

Mr. Charles Louis Pollard, chief curator of the Museum of the Staten Island Association of Arts and Sciences, and Mr. George P. Englehardt, of the Brooklyn Children's Museum, have returned from a collecting trip in North Carolina.

Benjamin F. Lutman (A.B. Missouri, 1906; Ph.D. Wisconsin, 1909), recently assistant in botany in the University of Wisconsin, has accepted a position as assistant botanist in the Vermont Experiment Station.

The new College of Agriculture of the University of the Philippines, opened June last with a registration of about sixty. E. B. Copeland is dean and professor of botany; H. Cuzner is professsor of agronomy.

Edward Murray East (B.S. Illinois, 1900; Ph.D. Illinois, 1907), of the Connecticut Experiment Station, New Haven, has been appointed assistant professor of experimental plant morphology in Harvard University.

Burton Edward Livingston (B.S. Michigan, 1898; Ph.D. Chicago, 1901), of the department of botanical research of the Carnegie Institution of Washington, has accepted an appointment as professor of plant physiology in Johns Hopkins University.

Miss Winifred J. Robinson of Vassar College has just returned from the Hawaiian Islands where she spent the summer

collecting ferns. The larger islands were visited and extensive collections were made, special attention being paid to the tree ferns.

Marshall Baxter Cummings (B.S. Vermont, 1901, Ph.D. Cornell, 1909), recently assistant in horticulture at Cornell, has been appointed professor of horticulture in the University of Vermont to succeed Professor William Stuart, who goes to the Department of Agriculture in Washington.

Among the delegates sent by various American colleges and universities to the Cambridge (England) Darwin Celebration were the following botanists: Professor W. G. Farlow, American Academy of Arts and Sciences, Boston, Professor J. M. Coulter, University of Chicago, and Mr. C. F. Cox, president of the New York Academy of Sciences.

Dr. J. L. Coulter, professor of agricultural economics in the University of Minnesota, Dr. H. C. Taylor, professor of economics in the University of Wisconsin, and Dr. C. F. Warren, Jr., professor of farm management in Cornell University, have been asked by Dr. E. D. Durand, the census director, to coöperate with him in work on the census schedules.

The University of Wisconsin has created a new department of plant pathology, and has appointed as professor in charge Dr. Lewis Ralph Jones of the University of Vermont. Professor Jones is a native of Wisconsin and after studying at Ripon College, was graduated from the University of Michigan, Ph.B., 1889, Ph.D., 1904; he came to the department of natural history in the University of Vermont in 1889, and has been professor of botany since 1893, and botanist of the Vermont Experiment Station since 1890. During this period he has carried on research work in the bureau of plant industry in Washington, and in Europe. In addition to gaining a high reputation as a teacher, he has occupied a field of wide service in Vermont in developing the work of the Vermont Botanical Club and the state forestry department, in securing for the University the Pringle Herbarium with Dr. Pringle as a curator, and recently in organizing a new department of teaching. As a public-spirited citizen and as an instructor he holds a secure position in the esteem and affection

of the students and the people of the state. Professor Jones will remain in Burlington until January, and enter on the work of his new appointment at the beginning of the second semester.

Lectures will be delivered in the lecture-hall of the Museum Building of the Garden, Bronx Park, on Saturday afternoons, at four o'clock, as follows:

Sept. 25. "Native Trees of the Hudson River Valley," by Dr. N. L. Britton.

Oct. 2. "Some Floral and Scenic Features of Porto Rico," by Dr. M. A. Howe.

Oct. 9. "The Flora of the Upper Delaware Valley," by Mr. George V. Nash.

Oct. 16. "Collecting Fungi at Mountain Lake, Virginia," by Dr. W. A. Murrill.

Oct. 23. "Autumnal Wild Flowers," by Dr. N. L. Britton.

Oct. 30. "Some Plant Diseases: Their Cause and Treatment," by Mr. Fred J. Seaver.

Nov. 6. "The Reclamation of the Desert in San Bernardino Valley, California," by Dr. H. H. Rusby.

Nov. 13. "The Hudson River Valley before the Advent of Man," by Dr. Arthur Hollick.

The lectures will be illustrated by lantern-slides and otherwise. They will close in time for auditors to take the 5:34 train from the Botanical Garden Station, arriving at Grand Central Station at 6:03 P. M.

The museum building is reached by the Harlem Division of the New York Central and Hudson River Railway to Botanical Garden Station, by trolley cars to Bedford Park, or by the Third Avenue Elevated Railway to Botanical Garden, Bronx Park. Visitors coming by the Subway change to the Elevated Railway at 149th Street and Third Avenue.

TORREYA

October, 1909

Vol. 9 No. 10

STUDIES IN THE OPHIOGLOSSACEAE — III: KEY TO BOTRYCHIUM IN NORTH AMERICA: GROUP OF B. TERNATUM

By Ralph Curtiss Benedict

The present paper is in completion of the series begun about a year ago, when keys to *Ophioglossum* in the United States and to the *lanceolatum* group of *Botrychium* for all North America were published. As was the case in those keys, the present key includes some forms which may not deserve recognition as species, but which are included in the hope that more information may be forthcoming as to their status. Some of the characters given here may prove inconstant, and the forms distinguished by them would then need to be reduced, but on the other hand, further field study may bring to light additional reasons for regarding others as distinct.

It is scarcely necessary to call attention to the fact that our present knowledge of these plants is almost entirely due to Dr. Underwood's pioneer work with them. This is true whether or not one accepts his conception of species, since there can be no question that he has indicated the more distinctive forms, whatever standing they may eventually be accorded. The recognition accorded them in the present treatment is based on a study of a large amount of material, and, I believe, will be found to be justified by the facts at hand.

In order that the group may be treated here as completely as were the other two, the characters by which it is to be distinguished from the *lanceolatum* group are reprinted from the second paper as follows:

"Group of *B. ternatum:* Bud hairy, common stalk hypogean,

[No. 9, Vol. 9, of Torreya, comprising pages 177–196, was issued September 27, 1909.]

short, usually less than one-quarter the height of the plant: spores maturing from July to October (three exceptions)." (*Sceptridium* Lyon.)

The following are included in the key: *B. obliquum*, *B. dissectum*, *B. silaifolium*, *B. californicum*, *B. decompositum*, *B. Coulteri*, *B. Schaffneri*, *B. Matricariae*, *B. pusillum*, *B. biternatum*, *B. Jenmani*, *B. alabamense*, *B. Underwoodianum*.

The above order is probably about as near an approach to a natural order as can be devised for so complex a group. The main divisions are for the most part as indicated in the key which follows:

Segments more or less deeply lacerate into linear often forking teeth (Vermont, Massachusetts, and Long Island, west to Indiana and south to Virginia and Kentucky). 2. *B. dissectum* Spreng.

Segments entire, crenulate or serrulate, not deeply divided.

- Tips of the penultimate divisions elongate, much larger than the lateral segments (New England to Wisconsin, south to Alabama and Arkansas, also in Jamaica). 1. *B. obliquum* Mühl.
- Tips of the penultimate divisions ovate to deltoid or fan-shaped to reniform, usually about as broad as long, the lateral segments mostly similar in shape and size.
  - Segments mostly acute or acutish (Northern and Western States, Mexico).
    - Plants usually rather large, lamina 7–20 cm. long, 10–30 cm. broad.
      - Lamina stalk usually 5 cm. or more long, plant not excessively fleshy, often very slender.
        - Segments mostly 5–45 mm. long, 2–20 mm. broad, few smaller.
          - Spores maturing from July to September.
            - Segments mostly oblong to ovate, margins crenulate or only coarsely serrulate (North Atlantic States and westward, Alaska to California). 3. *B. silaifolium* Presl.
            - Segments narrower, cuneiform, oblong or lanceolate, outer margins mostly sharply and finely serrulate (Mexico). 4. *B. decompositum* Mort et Gal.
          - Spores maturing from May to June, segments mostly elliptic to rhombic, expanded, plants lax (California). 5. *B. californicum* Underwood.
        - Segments all small, 2–5 mm. long, 1–5 mm. broad (Mexico). 6. *B. Schaffneri* Underwood.
      - Lamina stalk short, 1–4 cm. long, plant very stout and fleshy (Montana and Wyoming to Oregon). 7. *B. Coulteri* Underwood.
    - Plants normally smaller, lamina 2–4.5 cm. long, 3–7 cm. broad.
      - Lamina stalk not more than 2 cm. long, plants stout (Mexico). 8. *B. pusillum* Underwood.

Lamina stalk 2–8 cm. long (Northern States).

9. *B. Matricariae* (Schrank) Spreng.

Segments mostly rounded apically, cuneiform to lunulate (Southern States and Jamaica).

Spores maturing from February to April.

Bud with a few scattered hairs, lamina sessile or nearly so, segments mostly fan-shaped (Southern States).

10. *B. biternatum* (Lam.) Underw.

Bud densely hairy, lamina stalked, segments mostly oval or ovate (Jamaica). 11. *B. Jenmani* Underwood.

Spores maturing from July to October.

Plants slender, lax, segments cuneiform to lunulate (Southern States). 12. *B. alabamense* Maxon.

Plants rather stout, segments spatulate to ovate (Jamaica).

13. *B. Underwoodianum* Maxon.

Form differentiation in the group seems to correspond in most cases to the broader differences in climatic conditions as is indicated by the distribution accredited to some of the associated species. This differentiation, however, has apparently not proceeded exactly the same in different groups. *B. obliquum*, as recognized here, includes both the northern *B. obliquum* (in a more limited sense), the southern *B. tenuifolium*, and a Jamaican plant. The first two comprise extremes differing sharply from each other,* but which appear to be connected by all manner of intermediates in form and distribution. For the Jamaican plant I have been able to find no constant differences other than size.

In the *B. silaifolium* line on the other hand, not only are the extremes in form distinctly marked, but there seems to be a discontinuity in distribution as well, and no real intermediates are known. The line includes six forms in the eastern region. In the north are *B. silaifolium* (*B. obliquum* v. *intermedium* of authors), and *B. Matricariae*, the latter perhaps only a local alpine adaptation. In the Southern States we have *B. biternatum* and *B. alabamense*, differing both in form and in time of fruiting, and in Jamaica the parallel pair *B. Jenmani* and *B. Underwoodianum*. Further collections, for example in Cuba, may complicate the synopsis of these plants, but at present they seem very deservedly distinct.

* *B. obliquum*: segments somewhat contracted, the margins revolute, obscurely crenulate.

B. tenuifolium Underwood: segments expanded, thin, the margins plane, sharply serrulate or denticulate.

B. dissectum is of very doubtful validity and is probably to be associated with *B. obliquum*. *B. silaifolium* does not seem to develop the *dissectum* form. Gilbert's var. *oneidense* is a peculiar form * which seems to belong with *B. obliquum* although not typical.

The western forms are not nearly as well known as the eastern ones. More complete material may modify their grouping considerably, either by reducing their number, or possibly even by adding to it. Additional material is greatly to be desired with such notes as habitat, time of fruiting, and altitude.

New York Botanical Garden

SEEDLINGS AND ADVENTITIOUS PLANTS OF DROSERA

By Robert Greenleaf Leavitt

In Torreya for May, 1909, Miss Winifred Robinson published some interesting notes on bud-derived individuals of *Drosera rotundifolia* L.; the extraordinary growths springing from upper leaf surfaces while the leaves were still in organic union with the parent plant, and arising even from a flower stalk which had been broken off. References were also made to the literature of the subject; Nitschke's description of seedlings of the above species was cited. The conclusion is reached (p. 95) that "in each species except *D. binata* the first leaves [of adventive plants] resemble those of the adult." It is inferred (p. 89) that seedling foliage of *D. rotundifolia* is different from that of adventives.

Formerly I had for several years various species of *Drosera* in cultivation, raising seedlings or adventives, and often both, from the following species: *D. rotundifolia* L., *D. capillaris* Poir., *D. brevifolia* Pursh, *D. intermedia* Hayne, *D. linearis* Goldie, *D. filiformis* Rafin., *D. filiformis* var. *Tracyi* McFarl., *D. capensis* L., *D. indica* L. and *D. binata* Labill. (with *D. dichotoma* Banks & Solander, if this is distinct). I have seedlings of *D. uniflora* Willd. of Chile. Stages which might be termed adolescent, or

* Penultimate divisions broad, oblong (narrow and lanceolate in typical *obliquum*), the tips broad, usually rounded or blunt, the segments full, the margins plane, more or less finely and irregularly crenulate or bluntly denticulate. (Known from Massachusetts to Illinois.)

perhaps even nepionic, were found on herbarium specimens of other species.

With regard to seedlings of *D. rotundifolia*, of which I have examined many specimens, it seems to me that Nitschke's report is not at all representative. His examination was evidently incidental and the description is cursory. I have found the first foliage leaf blade circular, the five marginal tentacles provided with glands, the disc glands five, the whole entirely Droseraceous. The earliest foliage differs from that of the adult in size, in number and complexity of tentacles, but in no other essential respect that I can see.

When the seed has fallen far down in the moss and the seedling has struggled up to the light, defective leaves may be expected, due to poor illumination. Such were probably those found by Nitschke.

The first leaves of adventives differ, in my observation, only in being more advanced as regards size of blade and number and complexity of tentacles. Their more progressive condition is doubtless due to better food supplies. Were one to experiment with smaller and smaller leaves as sources of adventives, probably the tentacles could be carried back to the stage found in seedlings.

Goebel's observations on *D. binata* (cited p. 94) give rise to the question whether the early rotund leaves of this curious Australian species — the mature leaves of which are sometimes more than a foot high, and as many as six-pronged — may not be near the original form in the genus. I have sought to answer this question from a rather careful survey of the (about) eighty-five species in the genus, from the geographical distribution of the various types of leaf figure, and from a study of developmental stages. The whole matter is palpably speculative. By far the most probable supposition is, however, that a roundish blade was the original type, from which on one side came the elongated forms like *D. filiformis*, and from which on the other came the auriculate leaves of the section Ergaleium, and the "two-forked" one of *D. binata*.*

* See Reversionary Stages Experimentally Induced in *Drosera intermedia*, Rhodora 5: 265 (1903).

It is rather interesting to find that Darwin considered this question, and made a diametrically opposite guess. He thought *D. binata* primitive, and the original type of leaf in *Drosera* as elongated.* He did not perceive that these two suppositions are incompatible. The so-called "two-forked" leaf of *D. binata* is not forked — except in the variety *D. dichotoma*, where the lateral arms are often once or twice branched — but the prongs of the leaf are really upturned extremities of an enormously widened blade, this being the very antithesis of the condition in *D. filiformis* (of that in *Byblis* and *Drosophyllum* also).

The round blades exhibited by both seedlings and adventives in this species are probably reversions to a rotundifoliate ancestor. They appear on mature plants, replacing the "full character" leaves, when the plants are long subjected to a weakening process.

Adventives of *D. binata* do not always show reversionary first leaves, however. Buds on flower stalks and roots, being well nourished, generally produce plants the first leaves of which are crescentiform or fully binate; *i. e.*, of the adult type. This is acceleration of development occasioned by abundant food supply.

The tentacles of youthful leaves of all species are more interesting than the leaf-shapes. A type of marginal tentacle with the gland ventrally, rather than terminally, situated excited my curiosity, for I found it in almost all species studied in their infancy, even when the adult had nothing corresponding to it (*e. g.*, *D. binata*, *D. linearis*, *D. intermedia*, *D. capensis*, *D. filiformis*).† In modified form it is found in adult *D. rotundifolia*, *D. capillaris*, *D. uniflora*, and some other round-leaved species. Its presence in other species is plainly atavistic.

The youthful leaves of *D. intermedia*, *D. capensis*, and *D. linearis* are all round-bladed at first, thus differing from the adult leaves, which are spathulate in *D. intermedia*, linear or linear-lanceolate in *D. capensis*, and linear in *D. linearis*. In *D. filiformis* of Massachusetts nepionic leaves occurred distinctly spathulate and with atavistic marginal tentacles.

In seedlings and adventitious plantlets from leaves and flower

* Insectivorous Plants, p. 292. (Authorized Edition, Appleton.)

† This form of tentacle is described in Rhodora, *l. c.*, p. 270.

stalks of *D. filiformis* var. *Tracyi* from Georgia, and in seedlings of *D. indica*, I failed to find leaves differing in form or in marginal tentacles from the adult. The tentacles of course were somewhat simpler, but the type was the same. *D. indica* is an oriental caulescent plant with very slender linear leaves.

In conclusion: my observations are to the effect that in all species the earliest foliage leaves are possessed of characteristic Droseraceous features. In this sense, these early leaves are like the adult foliage. Any recapitulation is within the limits of the genus. Cases of deficient organization, or malformation, are excluded.

Secondly, in seedling and adventive *D. intermedia*, in adventive *D. linearis*, in seedling and adventive *D. capensis*, I found reversion to a round blade, in adventive *D. filiformis*, to a spathulate form; and in most species an atavistic condition of the marginal tentacles appears in the youthful leaves.

Thirdly, adventives may differ even within the same species, according to food supply. But in the species studied by me seedlings and adventives from small portions of the adult, as fragments of leaves, flower stalks, and roots, were found to be essentially alike as regards leaf shape and as regards the character of the marginal tentacles.

New Jersey State Normal School,
Trenton, New Jersey

LOCAL FLORA NOTES — I

By Norman Taylor

Under the above title it is proposed to bring before the members of the club problems that are in need of further elucidation. Being primarily problems of distribution they fall more within the province of the active members of the club as a whole than they do upon any one individual, whose precise knowledge of such data must necessarily be limited by the material at hand.

From results already tabulated it becomes increasingly certain that many species credited to all or part of the local flora range, either do not occur at all, or else, occur in such out-of-the-way and little-known localities that collections from them have failed

to find their way into herbaria where they may constitute a permanent record. The desirability of filling in such gaps before the encroachment of the cities destroys the opportunity for work of this character is apparent to all.

Members of the club or others interested are invited to send to the writer any stations for the plants to be discussed presently, that will throw light on the problems stated, and full acknowledgment for material thus submitted will be made. In order that the record of any station may be permanent it is essential that a specimen be placed in the club herbarium. Specimens thus deposited will always serve as a basis for a list of plant stations. They will also put at rest any doubts of subsequent workers who are at liberty to take on trust or not a printed list of plant stations, but are obliged to reckon with specimens actually collected from them. It also minimizes the often unavoidable errors in the determination of difficult or critical species. Only plants collected within the local flora range * are desired, and any notes made on distribution are understood to apply exclusively to this area.

The list follows :

Pinaceae

1. *Pinus resinosa* Ait. No specimens from the range. In Bull. Torrey Club **3** : 45, a station at Inwood, New York City, is recorded. Beyond this no stations are recorded so far as known, except Luzerne and Wayne counties, Pa. In the state herbarium at Albany there are specimens from Greene and Columbia counties. It has been impossible to verify the Inwood record, and the question arises Does it occur between this and the upper Hudson region ? Also, if it is in Luzerne and Wayne counties in Pennsylvania, why not in Lackawanna and also in Delaware county, N. Y.? According to recent treatments it occurs throughout New York and the upper part of Pennsylvania.

* The local flora range as prescribed by the club's preliminary catalog of 1888 is as follows : All the state of Connecticut ; Long Island ; in New York, the counties bordering the Hudson valley, up to and including Columbia and Greene, also Sullivan and Delaware counties ; all the state of New Jersey ; and Pike, Wayne, Monroe, Lackawanna, Luzerne, Northampton, Lehigh, Carbon, Bucks, Berks, Schuylkill, Montgomery, Philadelphia, Delaware, and Chester counties in Pennsylvania.

2. *Pinus pungens* Michx. f. There are no specimens from the range, the nearest being from Lancaster county, Pa. In Britton, Cat. Plants of N. J., 301, the following record is given: "Hunterdon Co., abundant one mile east of Sergeantsville." Reasoning from the general distribution given in recent works the tree should be found in the upper northwestern counties of New Jersey and southward through western Jersey and adjacent Pennsylvania. Has any one specimens from this territory?

3. *Pinus virginiana* Mill. Its New Jersey distribution is about as the books give it, but Miller & Young in Cat. Plants of Suffolk Co., L. I., credit the tree to that county. There are no Long Island specimens in the collections, and the question is whether it really grows there or whether it once grew there and has been eliminated, or whether the original identification was wrong. Some recent treatments credit the species to Long Island and others do not.

4. *Pinus Taeda* L. There is a single specimen from the range in the Columbia University herbarium marked simply "S. Jersey." It is not credited to the range in the Preliminary Catalog of the Club, in Britton Cat. of Plants of N. J., but in the Handbook of the Flora of Philadelphia and vicinity it is recorded from "Near Cape May." Does it occur north of the Cape May region? Specimens growing in the Botanical Garden have flourished several years, so on the score of temperature the upper pine barren country should not prove a barrier, and the plant may well occur north of Cape May.

5. *Larix Laricina* (Du Roi) Koch. Specimens in the collections bring this species down to Stockholm, Passaic Co., and Newton, Sussex Co., N. J. In the Cat. of Plants of New Jersey are the following more southerly stations: New Durham, Warren Co.; Closter, Bergen Co.; Budd's Lake, Morris Co.; Oxford Furnace, Great Meadows, and Green's Pond, Warren Co. Specimens are desired from any of these localities or to the south of them, so that its present southerly distribution in New Jersey may be determined.

6. *Tsuga canadensis* (L.) Carr. The most southerly station represented in the collection is the New York Botanical Garden.

There are numerous references to stations in New Jersey that are directly west of this or to the south of it, but no specimens from New Jersey are in the collections. How far south in New Jersey and adjacent Pennsylvania does the hemlock grow? General works credit the plant from Nova Scotia to (in the mountains) Alabama.

7. *Picea Mariana* (Mill.) B.S.P. Specimens in the collections show this growing only north of a line drawn from Litchfield, Conn., to Tannersville, Monroe Co., Pa. General works and numerous references in local floras seem to show that the tree grows south of this. How far south? Does it grow along the Palisades, or anywhere else in northern New Jersey?

8. *Abies balsamea* (L.) Mill. Specimens in the collections exclude this tree from the range except in the Catskills. General works and local floras credit it with a more southerly distribution, particularly in the mountains. How far down the Hudson Valley may it be found? Does it occur in the Pocono region? In New Jersey?

9. *Thuja occidentalis* L. West Point and the Highlands of the Hudson are the two most southerly localities represented in the herbaria. Most of the local floras and all the general works say that the plant grows at least in upper New Jersey. Has anyone specimens south of the above stations either in New Jersey or Pennsylvania?

Sparganiaceae

1. *Sparganium minimum* Fries. The only specimens of this plant in the collections are from Green Pond, N. J. The lately issued treatment in North American Flora gives Labrador to New Jersey, etc. Are any stations known for it in the Catskills, and is the plant localized at Green Pond, so far as the local flora range is concerned?

2. *Sparganium angustifolium* Michx. (*S. simplex angustifolium* of the manual). A line drawn from Canaan, Conn., to Green Pond, N. J., represents the southern limit of distribution as shown by the collections. The North American Flora treatment of the species gives the distribution thus: " Newfoundland to Connecti-

cut, Pennsylvania, etc." What Pennsylvania stations are known? How far south in New Jersey does the species come?

3. *Sparganium lucidum* Fernald & Eames. Specimens in herbaria from only two stations: Cypress Hills, L. I., and Southington, Conn. Any extension of the range is desirable. North American Flora says Massachusetts to New York, etc.

ZANNICHELLIACEAE

1. *Ruppia maritima* L. All the specimens in the collections come from maritime or sub-maritime localities. Is it known up the Hudson, Connecticut, Delaware, or Raritan rivers? If so how far up (accompanied with notes on the freshness or brackishness of the water, rise and fall in the tide)?

2. *Potamogeton Oakesianus* Robb. The only stations represented in herbaria are Wading River and Cold Spring Harbor, L. I., and Stephen's Creek, Atlantic Co., N. J. North American Flora gives the range of this as Maine to New Jersey, etc. An extension of the local range up the Hudson Valley and in northern New Jersey is desirable.

3. *Potamogeton natans* L. This species is not known south of Budd's Lake, N. J., and it may not be found much south of this. Recent studies have shown that *P. natans* is not the widely dispersed plant it was once thought to be. Has any one a record of its occurrence in southern New Jersey and adjacent Pennsylvania? Does it grow on Long Island?

4. *Potamogeton lateralis* Morong. Within the range of the club the only specimen is from Salisbury, Conn. It should be found in other places, although no record exists, so far as known, of other stations for the plant. Has anyone seen it elsewhere?

5. *Potamogeton angustifolius* Berch. & Presl. No specimens are in the collections from south of a line drawn from Philipsburg, N. J., to Rockland Lake, N. Y. The range given in North American Flora shows that the plant is found as far south as Florida. It should turn up in several localities in New Jersey and Pennsylvania.

6. *Potamogeton Robbinsii* Oakes. The only specimen is from Park River, Hartford, Conn. With a general range from Maine

to Pennsylvania it seems unlikely that this is the localized plant our collections would seem to indicate. Has any one seen it in northern New Jersey?

7. *Potamogeton confervoides* Reich. North American Flora gives the range for this species as New England to New Jersey and Pennsylvania. The only specimen in the collection was taken from Forked River, N. J. Are there no intermediate stations?

8. *Potamogeton crispus* L. In North American Flora the range includes the legend, "Obviously introduced from the Old World." This was based on the fact that all the specimens at hand come from near some city. Years ago this plant was thought to be indigenous to America. Has anyone seen plants in waters remote from civilization where the chances of its introduction are negligible?

9. *Potamogeton lucens* L. Specimens show that this plant thrives all along the Atlantic seaboard, except that within our range the specimens restrict it to Connecticut. This restriction is undoubtedly false, but there are no visible proofs to the contrary.

10. *Potamogeton Vaseyi* Robb. In North American Flora this plant is stated to grow from Maine to southern New York, etc. The only specimen we have is from Greenwood Lake. Is it found in the other lakes of upper New Jersey? In Rockland Lake or the Hudson?

11. *Potamogeton perfoliatus* L. Of all the pond weeds this species has been found nearest to salt water. It grows near Piermont on the Hudson, where there is a rise in the tide of 3½–4 feet. Has it ever been found well within the influence of salt water? The water at Piermont is almost fresh.

New York Botanical Garden

SHORTER NOTES

Fasciation in the Japan Honeysuckle. — Six examples of fasciation were found this fall in the Japan or Chinese honeysuckle, *Lonicera Japonica*, Thunb. The number of cases seen would indicate that fasciation is not unusual in this species; but

no earlier mention of it having been found, a brief statement is given below. The vine upon which they occur covers with a luxuriant growth one corner of the huge rock in the garden at Teachers College. The flattening is very apparent for a varying distance (8 to 15 inches) from the tip of the branch. Several inches below — where the branch shows the usual cylindrical shape — the apparently normal base of the fasciated branch is sometimes found to be but one fork of a previous but less conspicuous fasciation. In two cases the lower fasciation is two feet or more from the tip of the branch. The lower part of the branch, even when normal in shape, may bear three or even four leaves at a node; the middle nodes commonly bear six or eight, whorled or arranged in a spiral at the nodes; and near the tips ten or more leaves may be counted at each node. The tips of the branches have two or more growing points, each surrounded by its own cluster of leaves; they are apparently healthy, and two have an independent growth of three inches.

JEAN BROADHURST

A NEW GRASS ENDEMIC IN JAMAICA. — During a visit of Dr. Forrest Shreve to the Blue Mountains of Jamaica, West Indies, he found on Sir John Peak, at an elevation of 2,000 meters, a large grass growing in dense tufts, and covering rather extended areas, almost to the exclusion of other vegetation. It seems strange that so conspicuous a grass should remain undiscovered until his visit. Its discovery is especially interesting, as it adds not only a hitherto unknown species to the genus *Danthonia*, but brings this genus into the flora of Jamaica, it being before this unknown in the island. It is also the only known native species of the tribe Aveneae on the island.

The genus *Danthonia* comprises something over one hundred species, spread over the warm and temperate regions of both hemispheres. Of this number more than one half belong to southern Africa. A number are found in the Andes of South America, and in North America there are ten or a dozen species.

Following is a description of this interesting grass, which I take pleasure in associating with the name of Dr. Shreve, who first discovered it. The type specimen was collected by this

gentleman on May 7, 1906, at the place mentioned above, and is in the herbarium of the New York Botanical Garden. Mr. Wm. Harris, Superintendent of the Public Gardens at Jamaica, also secured it later at the same place.

Danthonia Shrevei Britton, sp. nov.

A densely tufted perennial, with rigid thick coriaceous leaves, and a short contracted terminal panicle. Stems erect, simple, smooth and glabrous, excepting at the puberulent apex, 6–10 dm. tall ; leaves numerous in the tufts, mostly on the innovations, those on the stem 2 or 3 ; sheaths straw color, those at the base short and broad ; ligule a scarious ring 0.5 mm. wide ; blades elongated, involute, the lower surface very rough, especially toward the apex, usually hirsute near the base but otherwise glabrous, the upper surface glabrous ; panicle 4–10 cm. long, the axis and erect appressed branches puberulent ; spikelets few, on short puberulent pedicels ; empty basal scales acuminate, smooth and glabrous, the first scale scarious, 1-nerved, a little shorter than the second which is green with scarious margins, 5–7-nerved, and 9–10 mm. long ; flowering scales with a hairy callus, 1–1.5 mm. long, the body of the scale, exclusive of the awns and callus, 5–7 mm. long, 9–11-nerved, appressed-hirsute toward the base, glabrous elsewhere, the teeth running out into awns 4–6 mm. long, the central awn spreading at right angles or nearly so, 1–1.5 cm. long.

George V. Nash

REVIEWS

Ward's Trees *

In this last volume, as in the others of the series, only English trees are included. Readable chapters on stems, branching, bark, climbing plants, and non-typical shoots form the first part of the book. The second includes shrub and tree keys based on shape and habit characters, as illustrated by the following extracts : (1) *Crown expanded and depressed, forming an umbrella-like or mushroom-like head on the elongated stem ;* (2) *bark orange or sienna and cast in large scales in the upper part of the stem ;* (3) *cones erect or outstanding ;* (4) *leaves isolated and extended in*

* Ward, H. Marshall. Trees : A Handbook of Forest Botany for the Woodlands and the Laboratory. Vol. V. Form and Habit. Pp. 308. f. 209. 1909. Cambridge University Press (Putnam's, New York).

flattened fan-like horizontal spray; and (5) *bark . . . cast in strips or plate-like scales.*

As these extracts indicate, this volume is intended for field use; and should prove helpful in England. The large number of American trees not included would of course make it rather puzzling to a beginner here. The illustrations will many of them prove useful in any botanical class room, however; a large number are new and show details and express relationships not given in the books accessible to the average teacher.

The third part of the book contains a brief illustrated key for tree and shrub seedlings which is very interesting and makes one wonder if such a thing is feasible in America with our wealth of deciduous trees.

Jean Broadhurst

TORREY BOTANICAL CLUB FIELD MEETINGS

October 23. — Special excursion for fungi. Party will meet at the Jerome Avenue entrance to Woodlawn Cemetery at 2 p. m., where they will be met by the guide, Mr. F. J. Seaver. Cost of trip, about 20 cents.

October 30, Wingdale, N. Y. — Train leaves Lexington Avenue Station (N. Y. Central, Harlem Division), at 8:52 a. m. Returning train leaves at 4:36 p. m. Bring lunch. Cost of trip, $3.25. Guide, Dr. E. B. Southwick.

Note. — Members are urged to verify times of departure of trains owing to possible changes in time-tables. The excursion on October 30 will be the last of the season.

The Field Committee,
Norman Taylor, Chairman

OF INTEREST TO TEACHERS

Botanical Supplies in City Public Schools

At a recent conference at the New York Botanical Garden Dr. Arthur Hollick presented some interesting data * with reference to the destruction of wild flowers as indicated by the list of supplies for high schools and training schools.

* Reprinted, in part, by permission from the *Journal of the New York Botanical Garden*, June, 1909.

In the list for 1907 some thirty species were included, all of which should be protected. Agitation of the subject resulted in the elimination of a majority of these from the list for 1908, but a number yet remain. Following is a list of these with the number of specimens supplied during the school year 1907–8, and the cost of each item :

	No. of Specimens Supplied.	Cost.
Aspidium marginale Sw.	431	$21.30
Polypodium vulgare L.	425	31.50
Salomonia biflora (Walt.) Britton	318	26.50
Aquilegia canadensis L.	36	1.05
Geranium maculatum L.	500	8.75
Eyrthronium americanum Ker	1,100	19.25
Gentiana crinita Froel	1,600	40.00
Arisaema triphyllum (L.) Torr.	288	8.40
Caltha palustris L.	1,800	31.50
Cypripedium acaule Ait	180	11.25
Trillium sp.	2,500	62.50
Wild orchid sp.	36	1.80
	9,414	$263.80

Steps are being taken to substitute cultivated for wild flowers wherever possible and the farm and grounds of the recently established Parental School on Long Island are being in part planted and developed with that end in view, so that the Department of Education may grow and distribute as many as possible of the items of botanical supplies required in the public schools.

Dr. Hollick suggested that if those who are interested in the matter of the preservation of our wild flowers would write to the Board of Education, asking that everything possible be done to eliminate wild flowers from the list of supplies, it would have the effect of hastening the end in view.

The September *Journal of the New York Botanical Garden* contains a very interesting and well-illustrated article on the protection of shade trees against fungi by Dr. W. A. Murrill. Even high school pupils will find this practical article very readable.

The Mariposa grove of Sequoias was threatened by fire during the latter part of August. Several square miles of forest adjoin-

ing Yosemite Park were devastated, but the work done by the United States troops prevented the fire from reaching the big tree grove.

Bailey's Cyclopedia of American Agriculture, the fourth volume of which was recently issued, makes a valuable addition to any biological department. For ready reference it is as invaluable as the Cyclopedia of Horticulture, and it unfortunate that the price prevents every teacher of botany from having one in the school library.

The diseases of deciduous forest trees are described in a recent bulletin (No. 149, Bureau of Plant Industry) by Dr. Hermann von Schrenk and Mr. Perley Spaulding. The pamphlet, which is well illustrated, includes a large number of tree diseases. As is usual in such government publications, remedies and methods of preventing the spread of the diseases are fully described. The blight of the white pine form two smaller circulars by Mr. Spaulding (circulars 35 and 38); this is considered rather serious as we are now dependent upon the *second* growth of white pine.

Plant preservation advocates in America have never met the warm encouragement that the Surrey (England) officials offer in order to put a stop to the serious damage done by persons uprooting ferns and wild plants growing in hedgerows and on commons, etc. The County Council of Surrey has made the following by-laws: "No person shall uproot or destroy any ferns or other wild plants growing in any road, lane, roadside waste, wayside bank, or hedge, common, or other public place, in such a manner or in such quantities as to damage or disfigure such road, lane, or other place. Provided that this by-law shall not apply to persons collecting specimens in small quantities for private or scientific use. A person offending against this by-law shall be liable to a penalty not exceeding £5."

A western newspaper says that "Texas and Oklahoma bid fair to reap a rare stroke of good fortune from the unprecedented hot weather. Dr. W. D. Hunter, government entomologist in charge

of the southern field crops, has issued a bulletin to the effect that the terrific heat has killed more than 99 per cent. of the boll weevils in Texas and Oklahoma, and that the heat and dryness of the season everywhere has brought out the small cotton plants and caused the bolls to open earlier than ever before. 'As a consequence,' Dr. Hunter states, 'if the farmers will accept the opportunity nature has provided, hasten the picking of the crops, uproot and burn the plants, there is no possibility that many weevils will be left. In fact, if the cotton plants should be destroyed generally in Texas by the middle of September, there would be no boll weevils whatever in Texas next year.'

"The importance of this statement will be appreciated when it is considered that the boll weevil has cut down the cotton crops more than one half, and in many parts of the state more than two thirds, while in other localities cotton raising has been abandoned altogether."

The New York *Tribune*, October 4, says that "practical unanimity exists throughout the cotton regions of Louisiana in favor of burning cotton stalks and clearing the fields before November 1. Mass meetings, attended by both white planters and negro tenants, have been held in many sections, and pledges exacted to conform to suggestions from government entomologists as to forestalling the boll weevil ravages next planting season. Effective work by federal agents has brought a change of sentiment in favor of modern methods in fighting the cotton pest, and this winter will find few hibernating places for the weevil."

The chestnut tree canker which has twice been presented by Dr. William A. Murrill in TORREYA, is the subject of a pamphlet by Dr. Haven Metcalf and Mr. J. Franklin Collins (Bulletin No. 141, part V., Bureau of Plant Industry). Emphasis is placed upon the destruction of infected trees, and a "campaign of education" advised. To aid in this the "Department of Agriculture will coöperate in the following ways: Specimens from suspected trees sent in by any person will be promptly examined and the presence or absence of the disease reported. Typical specimens showing the disease (with the fungus previously killed by soak-

ing in formalin to insure against any infection from this source) will be sent upon application to any inspector, forester, pathologist, or other State or experiment station officer, to any nurserymen or orchardist growing chestnuts, or to any botanist or teacher of botany. So far as the supply permits lantern slides and photographs will, upon application, be loaned for special lectures, exhibits, etc., to the officers of States, experiment stations or colleges. By these means the inspectors first, and then the general public, may become familiar with the appearance and work of the disease in localities that it has not yet reached, and when it does appear may be able to recognize it before it is too late to take efficient measures against it."

The pamphlet further states that "bark disease may be confidently looked for in any orchard or nursery in the United States that contains chestnut trees. All such places should therefore be rigidly inspected at the earliest possible date" as at present "there is nothing in sight that promises even remotely to check its spread into new territory except the general adoption of the measures advocated in these pages. It cannot be argued that because of its apparently recent origin and rapid spread it will soon disappear of itself. Such diseases as pear-blight and peach yellows have been in the country for more than a century and show no sign of abating except when actively combated by modern quarantine methods. Nor can any conclusions be drawn from the fact that chestnuts in the Southern States have suffered from a disease during the past twenty years, since, as already stated, that is a totally different thing from the bark disease."

NEWS ITEMS

Professor T. D. A. Cockerell, of the University of Colorado, has recently returned from Europe where he made some valuable collections.

Dr. Leigh Hunt Pennington (A. B., University of Michigan, 1907; Ph.D., 1909) has been appointed instructor in botany at Northwestern University.

During Professor L. H. Bailey's absence from Cornell this

year, Professor Herbert J. Webber will act as director of the College of Agriculture.

Yale University has recently received from Mrs. Morris K. Jesup $100,000 to establish the Morris K. Jesup chair of agriculture in the Forestry School.

Mr. Lee I. Knight (A.B., University of Illinois), formerly a member of the botanical staff of the University of Illinois, has been made associate professor of botany at Clemson College, South Carolina.

TORREYA has not previously announced the death of M. J. Iorns (Ph.D., Cornell), for several years horticulturist of the Porto Rico Experiment Station at Mayaguez; he died of typhoid fever in San Juan in May.

The United States Bureau of Plant Industry has recently had several noted visitors: Dr. Oskar Loew, formerly with the Porto Rico Experiment Station; Dr. H. T. Güssow, of the Experiment Station at Ottawa; and Mr. Aaronshon, director of the experiment station in Palestine.

At the University of Maine the following appointments have been made: G. E. Simmons (M.S., Ohio State University) and M. E. Sherwin (M.S., Missouri), assistant professors of agronomy; and W. R. Palmer (B.S., Oregon Agricultural College), instructor in horticulture.

TORREYA

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Vol. 9 No. 11

CAR-WINDOW NOTES ON THE VEGETATION OF THE DELAWARE PENINSULA AND SOUTHERN VIRGINIA

By Roland M. Harper

For some reason not altogether obvious, the flora of those parts of the eastern United States where either *Pinus Taeda* or *Pinus echinata* is the most abundant tree is rather uninteresting, as it consists of comparatively few and widely distributed species; and such regions are consequently not much frequented by botanists and not often described in botanical literature. Of this character is a considerable part of the Piedmont region of the Carolinas and Georgia, the summits (not the slopes or gorges) of the Carboniferous plateaus of Alabama, and those parts of the coastal plain which are outside of the ranges of *Pinus rigida*, *P. palustris*, and *P. Elliottii*; particularly in the neighborhood of Chesapeake Bay, and in northwestern Alabama, northern Mississippi, western Tennessee, southeastern Arkansas, etc.* In all these regions there are indeed some limited areas of seacoasts, swamps, rock outcrops, or other more or less exceptional geographical features which serve to diversify the flora and break the monotony, but in the prevailing short-leaf pine forests there is little to attract a botanical collector. Nevertheless, the vegetation of such places deserves to be studied just as much as that of the more favored regions where there is more excitement in the way of rare plants to be had.†

The pine-barrens of New Jersey and those of the southeastern states have been celebrated botanizing grounds for a century or more; but in the corresponding regions between the Delaware

* See Torreya 7: 44–45; Science II. 25: 541. 1907.

† See Torreya 6: 45. 1906; 8: 156. 1908.

[No. 10, Vol. 9, of Torreya, comprising pages 197–216, was issued October 26, 1909.]

and Roanoke Rivers there seem to be very few typical pine-barren plants, or other species, which are not more common elsewhere. It is not surprising therefore that comparatively little has been published about this region (outside of Dismal Swamp and vicinity) by botanists.

About two years ago (Bull. Torrey Club **34** : 351–377) I mentioned the principal sources of information about the flora of that part of the coastal plain between the James and Savannah Rivers. That part between the James River and Chesapeake Bay is almost never mentioned in botanical literature, although John Clayton, one of the pioneer botanists of Virginia, resided in that region during most of the eighteenth century; *and for the Delaware peninsula, which is somewhat more accessible, there seem to be at present less than a dozen "local floras." †

Leaving out of consideration papers dealing only with seacoast vegetation, (which has very little in common with that of the interior, is governed by different laws of distribution, and is not dependent on the presence of a coastal plain at all), the following contain most of the available information about the flora of this peninsula. The arrangement is chronological.

1. (Occasional references to plants of Wilmington and vicinity, in the published correspondence of Muhlenberg and Baldwin, especially in 1811.) Darlington's "Reliquiae Baldwinianae", 1843.

2. E. Tatnall. Catalogue of the phaenogamous and filicoid plants of Newcastle County, Delaware. 112 pp. 1860.

3. W. M. Canby. Notes of botanical visits to the lower part of Delaware and the Eastern Shore of Maryland. Proc. Phila. Acad. **1864** : 16–19.

4. J. W. Chickering. (Flora of Salisbury and Ocean City, Md.) Field & Forest **3** : 154–155. June 1878.

5. W. M. Canby. (Notes on certain trees of the Delaware peninsula.) Bot. Gaz. **6** : 270–271. Oct. 1881.

6. C. S. Sargent. (Forests of Delaware and Maryland.) Tenth Census U. S. **9** : 511. 1884.

7. H. H. Rusby. A botanical excursion to Asateague Bay. Bull. Torrey Club **18** : 250–255. Aug. 1891.

* See Barnhart, Jour. N. Y. Bot. Gard. **10** : 178. 1909.

† In Britton's list of local floras (Ann. N. Y. Acad. Sci. **5** : 237–300. 1890) there are mentioned only two for Delaware (both for the vicinity of Wilmington), two for Maryland (both for the vicinity of Baltimore), and four for Virginia (two of these pre-Linnaean, another for the mountains in the southwestern part of the state, and the fourth a very brief and bare list of plants from a very unnatural locality on the coast).

8. T. H. Kearney. (Northern limits of "austroriparian" plants.) Contr. U. S. Nat. Herb. 5: 456–457. 1901.

9. H. L. Clark. Notes on Maryland plants. Rhodora 6: 176–177. Aug. 1904.

10. W. D. Sterrett. Report on forest conditions in Delaware. Del. Coll. Agric. Exp. Sta. Bull. 82. Dec. 1908.

11. C. S. Williamson. Notes on the flora of central and southern Delaware. Torreya 9: 160–166. Aug. 1909.

There is also considerable valuable information about this region in the reports of the Bureau of Soils of the United States Department of Agriculture, and in other geographical and geological literature, which it would hardly be worth while to mention in such a brief and superficial paper as this.

Having given credit to previous botanical explorers, I will now mention some of my own experiences in the region between the Delaware and Roanoke Rivers, on the way from New York to North Carolina in July, 1908. On July 18 I left the fall-line at Wilmington, Del., and, without getting off the train, went southward via the "Cape Charles route" nearly the whole length of the Delaware peninsula, a distance of about 200 miles, to Cape Charles, Va., where connection is made with the steamer for Norfolk. This route passes through all three counties of Delaware; Wicomico, Somerset, and Worcester in Maryland; and Accomac and Northampton in Virginia. On July 19 I traveled westward from Norfolk on the old Atlantic and Danville R. R. (now a part of the Southern Railway), passing through the counties of Norfolk, Nansemond, Isle of Wight, Southampton, and Greenesville, before crossing the fall-line near Emporia, about 75 miles from Norfolk.

The various kinds of country seen in this 275-mile journey through the coastal plain may be briefly described as follows. From Wilmington nearly to Townsend, a distance of 29 miles, the route is through the Cretaceous region, a direct continuation of the corresponding portion of New Jersey, which has been described by Hollick * as the "tension zone" and by Stone † as the Delaware Valley–West Jersey region. The topography here is moderately hilly, the soil is grayish and loamy, and the

* Am. Nat. 33: 3, 8, etc. Jan. 1899.

† Proc. Phila. Acad. 1907: 452–459. 1908.

forests are nearly all destroyed. Grass-lands are more prevalent than plowed fields, somewhat as in New England.

The Eocene is said to be scarcely exposed in New Jersey and Delaware, and from Townsend to Cape Charles the country is mapped by geologists as Miocene, like the pine-barrens of New Jersey. The Miocene strata do not form much of the soil, however, being nearly everywhere covered by the so-called superficial formations of Pliocene and later age. Going southward from Townsend the country becomes gradually more level and sandy, pines more prevalent, the proportion of cleared land less,* and the civilization and crops more southern in character, all apparently without any abrupt transitions. The peninsula is too narrow to permit any extensive development of streams and valleys, and as the railroad keeps pretty close to the divide most of the way the vegetation visible from the train is mostly of the upland type. Navigable streams were crossed near Seaford and Laurel, Del., and Salisbury and Pocomoke, Md. These all rise in sandy regions, and appear blackish, as swamp water always does when it is several feet deep. Between Clayton and Dover, where the soil is less sandy, at least one muddy stream was crossed. On the left side of the Nanticoke River near Seaford is a faint development of sand-hills, analogous to those of Southeast Georgia, where this feature is best developed.†

Pines were first seen just south of Dover ; and around Felton, about ten miles farther south, a faint suggestion of southern pine-barrens was noticeable. In the southern half of Delaware, which is much more sandy than the northern, most of the towns showed unmistakable evidences of recent growth and prosperity, like all the sandier parts of the southeastern states at the present time. The principal crops here seem to be corn, sweet and Irish potatoes, apples, peaches, and pears.

Of the country between Norfolk and Emporia there is little to be said except that it is comparatively level near the coast and moderately hilly toward the fall-line, and more or less sandy all

* Except that the Maryland part of the peninsula seems to be a little less sandy and a little more under cultivation at present than southern Delaware.

† See Ann. N. Y. Acad. Sci. 17 : 25-27. 1906.

the way. Although there are many fields of corn, cotton, sweet potatoes, peanuts, etc., in this part of the coastal plain, there was generally plenty of virgin forest in sight. More swamps and bogs were seen west of Norfolk than on the peninsula, but no true pine-barrens, or ponds, in either part of the journey.

The prevailing aspects of the vegetation in each region passed through can be inferred from the following lists, in each of which the species conspicuous enough to be recognizable from the train are divided first into trees, shrubs, and herbs, and then arranged as nearly as possible in order of frequency, as determined by the number of times each was seen. Species noted only once in a given region are omitted from these lists in most cases, however. The nomenclature used is that of Robinson & Fernald's Manual, 1908.

Civilization has of course destroyed most of the original vegetation by this time, but it probably has not greatly changed the relative frequency of the native species in that which remains.

In the Cretaceous region of Delaware the country is so largely deforested that the herbs visible from the railroad are mostly weeds, and therefore hardly worth mentioning. The commonest trees seem to be *Liriodendron Tulipifera*, *Liquidambar Styraciflua*, *Salix nigra*, *Castanea dentata*, *Quercus alba*, *Cornus florida*, and *Acer rubrum*.

As no distinct natural boundaries were recognized between Townsend and Cape Charles, I have subdivided this 170 miles of the journey arbitrarily by the two state boundaries crossed. This method, although not very scientific, brings out the gradual change of vegetation in going southward about as well as any other that might be selected.

Between Townsend and Delmar (which is on the boundary between Delaware and Maryland, as the name signifies), a distance of 68 miles, the following species were the most conspicuous:

Trees. — *Pinus Taeda*, *P. virginiana*, *Magnolia virginiana*, *Liquidambar*, *Nyssa sylvatica* (?), *Liriodendron*, *Castanea dentata*, *Salix nigra*, *Acer rubrum*, *Cornus florida*, *Quercus alba*, *Q. falcata*, *Q. Phellos*, *Diospyros virginiana*.

SHRUBS. — *Sassafras variifolium* (mostly a weed), *Alnus rugosa*.*

HERBS. — *Daucus Carota, Trifolium arvense* (these two introduced), *Asclepias tuberosa, Juncus effusus, Nymphaea advena, Pontederia cordata, Osmunda cinnamomea, Pteris aquilina, Lilium superbum, Plantago lanceolata, Lepidium virginicum, Cyperus esculentus* (the last three weeds).

According to Sargent (Tenth Census U. S. **9**: 511), in the sandy soil of southern Delaware the pines formed fully half of the original forest growth, which was long ago cut away and replaced by a second growth, which however consisted mostly of the same species. Sterrett, writing a quarter of a century later (Bull. **82**: 10–12, 17, 19), estimated that only about one-fourth of the area of Delaware is now wooded, and that there is practically no virgin forest in the state. He also states that "Originally the forests of Sussex County [the southernmost] were almost exclusively of hardwoods, but by culling and clearing them pine has gradually been established in every part of the county"; and again: "Lumbering the forests and clearing the land for agriculture have greatly increased the amount of pine and extended its range much farther north." The evidence on which these statements are based is not given, however, and one would probably make no serious error in assuming that *Pinus Taeda* and *Pinus virginiana* were always the most abundant trees in southern Delaware, as they seem to be at present.

In a distance of about 36 miles through Maryland the following species were each noted at least twice:

TREES. — *Pinus Taeda, Liquidambar, Quercus Phellos, Magnolia virginiana, Acer rubrum, Nyssa sylvatica* (?), *Taxodium distichum, Fagus grandifolia, Chamaecyparis thyoides, Quercus falcata, Diospyros.*

SHRUBS. — *Aralia spinosa, Alnus rugosa, Rhus copallina.*

HERBS. — *Nymphaea advena, Pteris aquilina.*

This list is too short to draw any important conclusions from, but the greater relative frequency of *Quercus Phellos, Taxodium*

* Some of the *Alnus* seen in Delaware and Maryland may have been the rare and local *A. maritima*, which I have not learned to distinguish under such conditions.

distichum, and *Aralia spinosa* in it as compared with the next above, and the scarcity of *Pinus virginiana* (which was seen only once in Maryland) seems to indicate more of a climax type of vegetation and therefore presumably a somewhat richer soil than the average for the Miocene portion of Delaware.

In Accomac and Northampton counties, Virginia, the following species prevail along and near the axis of the peninsula:

Trees. — *Pinus Taeda, Liquidambar, Pinus virginiana, Ilex opaca, Cornus florida, Quercus alba, Fagus, Oxydendrum arboreum, Acer rubrum, Quercus Phellos, Nyssa sylvatica* (?), *Quercus Michauxii, Pinus echinata, Magnolia virginiana, Quercus falcata, Q. nigra, Diospyros.*

Shrubs. — *Myrica cerifera, Aralia spinosa, Alnus rugosa, Tecoma radicans, Rhus copallina, Clethra alnifolia.*

Herbs. — (None seen worth mentioning.)

The relative scarcity in this list, as compared with the two next preceding, of *Magnolia, Liriodendron, Salix, Taxodium, Chamaecyparis, Nymphaea*, and *Lilium* is doubtless due mostly to the narrowness of the Virginia part of the peninsula and the consequent scarcity of fresh-water streams and swamps. The *Cornus, Fagus, Aralia, Myrica, Quercus Michauxii, Q. nigra, Ilex, Oxydendrum, Pinus echinata*, and *Tecoma* on the other hand are decidedly more abundant in Virginia than in Delaware and Maryland, perhaps only because the center of distribution of each of these species lies farther south; especially in the case of *Oxydendrum* and *Quercus Michauxii* which have their northernmost known stations on this very peninsula. It should be noted in passing — though I am not yet prepared to explain the significance of the fact — that most of the ten species last mentioned are typical hammock plants in the southeastern states.

Between Pinner's Point (the railroad terminus just across the harbor from Norfolk) and Pleasant Shade, Va. (about eight miles west of Emporia), where metamorphic strata were first noticed, the following species were seen more than once.

Trees. — *Pinus Taeda, Liquidambar, Liriodendron, Quercus alba, Salix nigra, Pinus echinata, Taxodium distichum, Nyssa sylvatica biflora* (?), *Magnolia virginiana, Quercus falcata, Oxy-*

dendrum, Cornus florida, Quercus Phellos, Acer rubrum, Ilex opaca, Diospyros, Fagus, Quercus marylandica, Nyssa aquatica, Quercus nigra, Betula nigra.

SHRUBS. — *Arundinaria tecta, Myrica cerifera, Alnus rugosa, Rhus copallina, Clethra alnifolia, Tecoma, Phoradendron flavescens, Aralia spinosa, Ilex glabra, Vitis rotundifolia, Rubus cuneifolius, Prunus angustifolia* (the last two or three weeds).

HERBS. — *Senecio tomentosus* (a weed?), *Eupatorium rotundifolium, Chrysopsis graminifolia, Eupatorium capillifolium* (a weed), *Xyris* sp., *Pteris aquilina, Habenaria cristata, Polygonum Hydropiper, Daucus Carota* (these two introduced), *Juncus effusus, Rhynchospora inexpansa, Ambrosia artemisiaefolia* (a weed), *Verbascum Thapsus* (introduced), *Scirpus Eriophorum, Polygala lutea, Rhynchospora corniculata, Rhexia Mariana* (?), *Mesadenia atriplicifolia* (?).

This list differs from the three or four preceding in the absence of *Pinus virginiana, Chamaecyparis,* and *Castanea,* and the presence of *Arundinaria, Nyssa aquatica, Betula, Phoradendron, Ilex glabra, Senecio tomentosus,* and *Eupatorium rotundifolum. Taxodium, Liriodendron, Salix,* and *Alnus* seem to be more abundant west of Norfolk than on the peninsula, perhaps on account of the greater development of streams.

The following among the species observed from the car windows (or conspicuous by their absence) deserve a little more notice than has been given above. In a few cases notes made on the same trip, in the Piedmont region of Virginia, west of Emporia, have been drawn upon to make the data for certain species which are not confined to the coastal plain more complete.

Senecio tomentosus Mx. Common along the railroad in Nansemond, Isle of Wight, and Southampton Counties, Virginia, from about 12 to 63 miles west of Pinner's Point. I did not see it elsewhere on this trip, though C. S. Williamson (Torreya **9**: 166) has reported it as common in southeastern Delaware.

Oxydendrum arboreum (L.) DC. First seen near the southern edge of Accomac County, Virginia.

Aralia spinosa L. Not seen in Delaware, but common in

Somerset and Worcester Counties, Maryland, and still more so in the two peninsula counties of Virginia.

Polygala ramosa Ell. Noticed only once, and that in Southampton County, Virginia. (Several southern pine-barren plants seem to have their northern limits in this same general region, a little west of Dismal Swamp.)

Ilex opaca Ait. First noticed a little south of Bloxom, Accomac County, Virginia, and last about seven miles east of Emporia. In the "manual region" this species seems to be almost confined to the coastal plain, but farther south it is not so restricted.

Nymphaea advena Ait. Seen in most of the rivers and estuaries of Delaware and Maryland, but not at all in Virginia. Farther south it is not known in the coastal plain at all, its place being taken by other species of the same genus.

Magnolia virginiana L. First seen just north of Townsend, Delaware, apparently just about where the Miocene begins. Last seen in Brunswick County, Virginia, about 12 miles west of Emporia.

Castanea dentata (Marsh.) Borkh. Seen a few times between Kirkwood and Wyoming, Delaware, stopping just about where *Pinus Taeda* begins. Not seen elsewhere in the coastal plain on this trip.

Fagus grandifolia Ehrh. (Lately known as *F. ferruginea*, *atropunicea*, or *Americana*.) Not seen until after passing King's Creek, Somerset County, Maryland, strange to say. Thence rather common southward. Possibly this represents the var. *caroliniana* (Loud.) Fernald & Rehder (Rhodora 9: 114. 1907), to which is assigned a decidedly more southern range than the type.

Myrica cerifera L. Abundant in the two peninsula counties of Virginia, often attaining a height of ten or twelve feet. Common in the coastal plain west of Norfolk, to within about seven miles of Emporia.

Arundinaria tecta (Walt.) Muhl. Common in the coastal plain west of Norfolk, and seen once in Mecklenburg County, Virginia, fifty miles west of Emporia.

Taxodium distichum (L.) Rich. Seen twice in Somerset County, Maryland, and several times between Suffolk and Drewryville, Virginia. It seems to stop about twenty miles short of the fall-line in Virginia. Sterrett, Williamson, and others have reported it from southern Delaware.

Pinus virginiana Mill. First seen between Viola and Felton, Del., thence rather frequent to Cape Charles. It probably does not occur at all in the coastal plain south of Hampton Roads, however. In the Piedmont region of Virginia it begins to appear in Mecklenburg County, and occurs at infrequent intervals from there to the foot-hills of the Blue Ridge.

Pinus rigida was not seen at all on this trip, which is rather surprising in view of its reported abundance in New Jersey.*

Pinus Taeda L. Common from Dover, Del., to Emporia, Va., thence more scattered in Brunswick County (in the Piedmont region), and rather scarce in Mecklenburg County, where most of the specimens seen were second growth. Last seen between South Hill and Union Level, about 118 miles west of Norfolk.

Pinus echinata Mill. Seen once in Maryland, three times in the Virginia part of the Delaware peninsula, and eight or ten times between Norfolk and Emporia. As *Pinus Taeda* fades away this species becomes more abundant, and it is the prevailing pine in the Piedmont region.

Pinus palustris was not seen anywhere, though the conditions appeared very favorable for it in some places in Nansemond County, Virginia, and it was formerly reported farther north than that.†

* In this connection Vermeule's remarks on its occurrence in the southwestern part of New Jersey (Ann. Rep. State Geol. N. J. 1899 [Forests] : 97–98. 1900) are of interest.

† See Bull. Torrey Club 34 : 375. 1907.

TERATOLOGICAL FORMS OF CITRUS FRUITS*

BY S. B. PARISH

Malformations as remarkable as are some of those which have been described and figured in the pomes, notably the pear, do not appear to have been noticed in the hesperidiums. But while these curious forms are of merely scientific interest, and are without economic importance, among oranges and lemons those most commercially valued are, teratologically considered, mere monstrosities.

The best lemons are varieties which habitually abort the ovules, and, therefore, bear seedless fruits, which are, for that very reason, preferred to those which are perfect and seed-bearing. There are also other, and objectional deformities to which the lemon is subject. The simplest of these is a roughening and thickening of parts of the rind, causing elevated longitudinal ribs, or sections, of greater or less breadth.

Occasionally the carpels themselves are more or less atrophied. This results in such forms as *d* and *e* in the accompanying figure, in which the vestiges of the carpels are contained in the bulb-like extremities of the fruit. In *f* and *g* are shown forms of still further degeneracy, in which the carpels have entirely disappeared, only the pericarp remaining, which is further deformed by fission.

Syncarpy, one of the commonest teratological conditions in fruits, is often exhibited by lemons. In specimens which have come under my observation it was confined to the coherence of only two individuals, but it is probable that a larger number may sometimes be involved. In some cases the coalesence is so complete that the proper outline of the fruit is little affected; more commonly the union is incomplete. Usually one member is not fully developed, as *a* and *c*, or both may be only imperfectly developed, as shown in *b*. Syncarpy also occurs in the orange, but more rarely than in the lemon.

The most esteemed varieties of the orange are also those which abort the ovules, and produce seedless fruit. This is the case with the navel, the choicest orange grown in California, which exhibits, in addition, a more pronounced teratological modifica-

* Illustrated with the aid of the Catherine McManes Fund.

tion. A navel is, in reality, the consolidation of two oranges, one rudimentary, whose atrophied remains occupy the distal extremity of the developed fruit. In the market are found only specimens in which the abortive orange is merely vestigial, and is entirely included within the rind of the developed one, its pres-

Syncarpy, atrophy, and fission in lemons.

ence being indicated by a small orifice, the so-called "navel." But among the "culls," which are rejected in packing, may be found abundant examples in which the secondary orange is more nearly normal, and is often more or less, occasionally entirely, exterior to the other. It may even contain a few reduced carpels with juicy cells, but is always wrinkled and corrugated. In other

cases it takes the form of a cornute projection, which may be two or three inches in length.

However small the "navel" orifice may be it is point of weakness in the rind of the orange, and renders it peculiarly liable to "splitting." This is a term applied to the opening of fissures in the pericarp, whereby germs of decay are admitted to the interior. Orchardists are not agreed as to the causes which produce the tension within the orange, but the resultant ruptures often occasion a large percentage of loss in the crop.

San Bernardino, California

THE FATE OF A VIOLET, OR THE BENEFIT OF CLEISTOGAMY

By E. J. Hill

The efficacy of cleistogamy in the preservation of a species under adverse conditions of environment was well shown by a case which came under my observation a few years ago. The area now comprised in Hamilton Park, one of the smaller parks of Chicago, is but a block from where I have lived since 1885, and was familiar ground for botanical study and collecting for ten years previous. It was in part undisturbed prairie; in part wooded by a scattered growth of oaks and shrubs in the dryer portion. There was a low ridge of sand forming the southern part of the area, with an herbaceous flora common to low sand dunes. The remainder was wet or wettish prairie in which the sand was mixed with humus a foot or more in depth, making a black soil resting on the pure sand of the old lake bottom, akin to that of the low ridge. The property being for a long time in litigation was nearly all left vacant until used for the park, while the grounds contiguous had been largely taken for dwellings. The making of streets and construction of sewers served to drain the wet sections, and as commonly happened in such cases some of the plants of the dry ground moved into the drained portion to associate with, or supplant, the less resistant original occupants; and plots where *Cypripedium candidum*, *Viola blanda*, *V. lanceolata*, and the like once flourished were taken by *Phlox bifida*, *Viola pedata*, and their associates. The last mentioned did this

on a large scale, and multiplying abundantly in the richer soil of the prairie, which held enough of sand for its nature, soon stocked the ground. Blooming profusely the showy flowers were doomed to be picked by the people living around, especially by the children. As more houses were built and population increased the case of the violets became more and more adverse. They were literally picked by the hundred by the eager visitors. This resulted in the extermination of the plant in a few years, and long before the ground was taken for the purpose of the park, about five years ago, not a bird-foot-violet could be found. Johnny jump-up, as the children called the plant, had succumbed to the predatory habits of the flower gatherers. Had it not been an exception to the usual custom of the genus in producing cleistogamous flowers, I should have expected a different result. This seems evident from the ability of the various species of blue violets, which abound in the woods and fields contiguous to the city, to hold their place notwithstanding they are picked annually in great numbers. The inconspicuous summer and autumn flowers, unknown to the vast majority of flower gatherers, and without attraction to such, provide the seeds for multiplying and perpetuating their kind. Hence I do not perceive any sensible diminution in their numbers when not subject to other causes than the gathering for bouquets.

CHICAGO, ILLINOIS

REVIEWS

Kükenthal's Cyperaceae-Caricoideae*

The volume of the Pflanzenreich issued on May 18 last, contains the first attempt to present descriptions and keys of all species of *Carex* and related genera occurring throughout the world. The work — a bulky volume of over 800 pages — is the result of many years' labor by the learned author Georg Kükenthal. It contains a very great amount of material of interest and value to all students of the genera dealt with, and will prove of great aid to American students.

* Das Pflanzenreich (38 Heft. IV. 20) Cyperaceae-Caricoideae by Georg Kükenthal. Pp. 384. f. 128. Wilhelm Engelmann, Leipzig, 1909. Mk. 41.20. (Issued May 18.)

The genera recognized are *Schoenoxiphium* with six species all natives of Africa; *Kobresia* with twenty-nine species mostly natives of Asia, two only reaching North America; *Uncinia* with twenty-four species, chiefly South American and Australasian, but with two or three species reaching tropical North America; and *Carex* with 798 species, some 282 of which are found in North America.

Of course, *Carex* is the genus with which North American botanists will be chiefly interested, and when one finds that fewer North American species are given than were recognized by Prof. Bailey more than twenty years ago, he becomes doubtful whether the learned author has adequately treated the genus as represented on this continent. This doubt is strongly increased when one notes the large number of North American species to which reference is made, but with which the author is not acquainted; and is certainly not lessened when one further notes the few specimens of many critical species seen by the author. The fact seems to be that the author's material of many North American species was hopelessly inadequate, and in many groups insufficient to enable him to properly understand them. In dealing with these groups it would naturally be expected that some slight attention would have been paid to the more recent treatments given them by American authors, but comparatively little has been. As a result we have such monstrosities as *Carex straminea* with nine recognized varieties and seven forms; almost all the varieties being more well-marked and more distinct from one another than are *Carex leporina* L. and the plant treated as *Carex petasata* Dew., which are recognized as distinct species! Similar but less pronounced unnatural arrangements are found in dealing with other species.

The main division, too, of the species is archaic in the extreme. Who would have believed it possible at the present time for an expert on the genus to divide it into groups depending on whether there were one or many spikes. Yet this is exactly the basis of the main division of the genus, and as a result we have species like *Carex exilis* Dewey, *Carex Fraseri* Andr., *Carex Geyeri* Boott, and many others torn from their

natural relationships and put in as part of a mixture labeled "Primo-Carex Kükenthal." Of course it will be recognized that there are a good number of species with one spike which are very closely related, but such a group as is here created is as unnatural as it is needless.

The author, too, is bold indeed in at times reducing critical species to varieties of some other species more or less closely related, when he apparently has had no specimens of the species so treated at hand; nor has care always been taken to see that keys and group descriptions accord with description of species in the group. For example, *Carex subulata* Michx. is put in a group characterized by an enlarged style-base, but that species itself is described as without such a base. Again there are numerous species which it would be hard to key into the groups recognized by the use of the keys to the groups.

The strong and valuable features of the work to the American botanist are the manner in which the value of characters taken from the rootstock and lower part of the culm and from the style are emphasized and made use of. These are characters which have been too long neglected in this country, and if noticed will much simplify the study of some of the more difficult groups. The vast amount of synonymy collected will prove of great assistance, although it is very evident that it is neither entirely exhaustive nor altogether properly disposed of. The key characters in the smaller groups are generally arranged with care and differences between closely related species are sharply brought out. The descriptions too as a rule are full, although many more measurements should have been given. There are numerous excellent plates scattered through the volume and the printer's part of the work is thoroughly well done.

It may then in closing be said that as a first attempt at one of the most difficult tasks to which a botanist could apply himself, the work is worthy of high commendation indeed, but as far as the American species are concerned the author has unfortunately been much handicapped by lack of material, and has not made as much use as he might of American literature.

KENNETH K. MACKENZIE

PROCEEDINGS OF THE CLUB

October 12, 1909

The meeting was called to order at the American Museum of Natural History, with Vice-president Barnhart in the chair. There were 22 persons present. Resignations were accepted from Miss Mary H. Price and Miss Mabel Denton. Mr. Leon L. Cypress was elected a member of the Club.

The program of the evening consisted of an illustrated lecture by Dr. John Hendley Barnhart. The paper has been published with slight modifications in the *Journal of the New York Botanical Garden* for August, 1909, and will appear in the next number of Torreya.

Percy Wilson,
Secretary

OF INTEREST TO TEACHERS

Liverwort Types for Elementary Classes

By W. C. Coker

In the liverworts we find the first conspicuous appearance of alternation of generations in plants, and it is here that it behooves the teacher to bring his pupils to a clear understanding of this fundamental morphological fact. All teachers of experience know that here we arrive at the *pons asinorum* of botany, but we should see to it that no student is kept on the wrong side by any unnecessary narrowing of the way.

In looking for a type, then, to use in our elementary classes it seems to me of the utmost importance that one should be selected that shows this alternation of generation in the clearest and simplest manner — as little obscured as possible by complex morphology. Now, if we examine the text books that are at present being used or that have been used for the last twenty years we find that the liverwort type is *Marchantia*, as complex and difficult a plant as the group affords, and one as little suited for this use as could well be found. The complex thallus, the stalked and still more complex archegoniophores and antheridio-

phores (names repulsive enough to any student), the hidden antheridia, and the small sphorophytes with their delicate vestments difficult to demonstrate, make *Marchantia* a formidable object to the beginner. His mind becomes so crowded with detail that he is apt to overlook the fundamental relations.

Contrasted with *Marchantia* let us take such a type as *Pallavicinia.* In Fig. 1 is shown in the same section a longitudinal

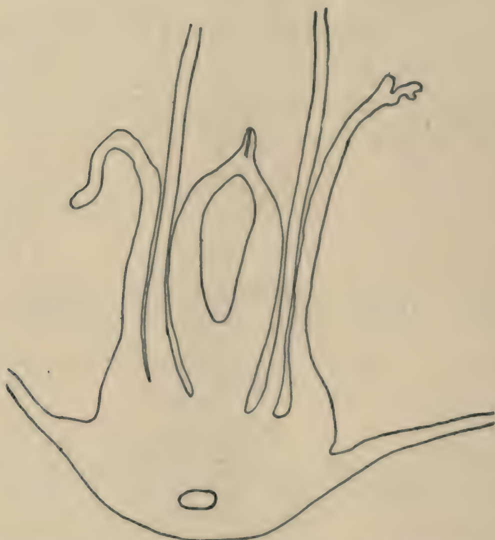

Fig. 1. Cross-section of female gametophyte of *Pallavicinia Lyellii*, showing involucre, perianth, archegonium, and young sporophyte.

view of the young sporophyte and transverse view of the gametophyte. All parts are shown and their relations are absolutely clear. Take four such sections at different ages, beginning with the mature archegonium, and the whole subject of alternation is presented. The gametophyte is so simple that it can be understood at once and the sphorophyte is so large and conspicuous as to prepare the student for the next step. The male plant is equally simple, and the antheridia can be seen with the naked eye without any dissection. A cross-section of the male plant through an antheridium is shown in Fig. 2. The only deficiency of *Pallavicinia* is the absence of gemmae, but for the study of

hese another thallose liverwort such as *Metzgeria* may be used. In this plant the gemmae are borne abundantly on the slightly incurved margins of the thallus.

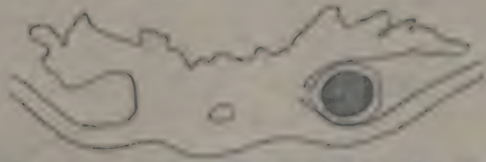

FIG. 2. Cross-section of male gametophyte of *Pallavicinia Lyellii*, showing an antheridium.

For the study of the capsule and the relations of its contents I have found nothing that approaches *Frullania virginica* in clearness. Here, the elaters extend the entire length of the capsule and alternate with single rows of spore mother-cells.

FIG. 3. Diagram of young sporophyte and surrounding parts of *Frullania virginica*.

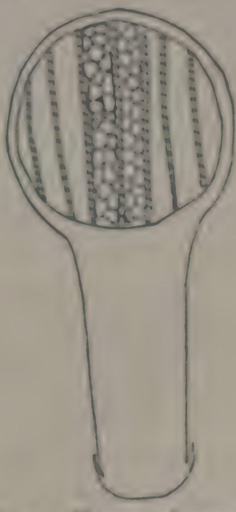

FIG. 4. Diagram of sporophyte of *Frullania virginica*. (Spores represented in two middle rows only.)

The homologous origin of these two elements is thus very clearly brought out, especially if a younger stage be studied. In FIG. 3 is shown a capsule of this species at an early stage. The spore-bearing portion is represented by a palisade of long undivided cells not yet differentiated into elaters or mother-cells. This sec-

tion, when compared with FIG. 4, brings out clearly the structure of the mature capsule and the relation of its parts.

UNIVERSITY OF NORTH CAROLINA,
CHAPEL HILL, NORTH CAROLINA

More teachers should receive the monthly list of publications sent, without charge, to all who apply for it by the Division of Publications of the United States Department of Agriculture. This four-page announcement gives a long list of the latest circulars and bulletins on agriculture and economic plants, on forestry and soils; many of them are very useful as references in teaching botany, zoölogy, and nature study.

Science for October 22, 1909, contains a short article by Professor John W. Harshberger on the plant remains of Pompeii. A study of the plant specimens exhibited in the National Museum at Naples yields the following list, which Professor Harshberger says is doubtless incomplete, representing probably the plants to be found in the markets in August (the date of the eruption being August 24). The plants are almond, chestnut, filbert, pine seeds, and walnut; apple, carob, fig, grape, and pear; barley and millet; onion, garlic, bean, and lentil.

The basket willows, according to a recent Farmers' Bulletin (No. 34, United States Department of Agriculture), was introduced by some German immigrants into New York and Pennsylvania about sixty years ago. The most rapid spread is through the non-arid parts of the southwest, where at least three species are commonly grown.

The United States Forest Service, according to *Science*, is planning to introduce a number of the more important eastern hardwoods into California, and "will this year experiment with chestnut, hickory, basswood, red oak and yellow poplar or tulip trees. Small patches of these trees will be planted near the forest rangers' cabins on the national forests, and if these do well larger plantations on a commercial scale will soon be established on wider areas. There are over 125 different species of trees in

California, a number of which produce some of the most valuable varieties of lumber in the country. Although considerably over one half of the species are hardwood or broad-leaved trees, yet, with the exception of the exotic eucalyptus, there is not a single species of hardwood here ranking in commercial importance with the leading eastern hardwoods. Climatic conditions in many parts of California are favorable for the growth of a number of the valuable hardwoods, and the absence of these trees is due mostly to unfavorable factors of seed distribution."

Professor Milton Whitney, chief of the soils bureau of the Department of Agriculture, has recently issued a bulletin showing that the long-cultivated soils of the leading nations are not only producing greater crops than at any earlier period, but are producing much more than the comparatively new soils of the United States. The average wheat yields (1897–1906) were 32 bushels an acre in Great Britain, 28 in Germany, 20 in France, and barely 14 in the United States. In the last twenty-five years the average yields of wheat in Germany have increased from 18 to 30 bushels an acre, of rye from 15 to 25 bushels, and of oats from 28 to 55 bushels. Similar statistics for other countries sustain the same view, and a study of American crop statistics for the last forty years shows that there is no general decrease in yields. These statistics also show that the older states whose soils have been longest in use are producing the largest yields. Even the soils of New England have materially increased in yields of corn and wheat in forty years; but what is more remarkable, they are producing considerably heavier yields than the soils of the Mississippi Valley states (*e. g.*, wheat 18 bushels an acre against 13 bushels for the forty-year average).

Another recent article by James J. Hill in the World's Work makes an appeal for the conservation of the soil fertility, giving as an instance of this need the striking contrast between the soils of France and Spain. Both countries have been cultivated for a very long time. One of them is exceedingly fertile and is rich and prosperous. The other is chiefly sterile and is poor and unprosperous. While it is quite true that New England produces far more wheat by the acre than any western state, it is also true

that New England contains many so-called abandoned farms which produce little or nothing. "The lesson, writ large on every field, is this: That it is not the length of time during which land has been cultivated, but rather the manner in which it has been and is cultivated, which determines its productiveness." For Mr. Hill points out that while the richest virgin soil is not so productive as the carefully tilled and fertilized soil of old settled places, a few seasons' cultivation suffices to exhaust either if their fertility is not replenished.

In discussing the "demonstration" work now being conducted in various states by the United States Department of Agriculture, the *Outlook* says: "It is not difficult to persuade the farmers of the desirability of increased crops, but it is difficult to persuade them that it can be done. Finally, one or more farmers in each district are persuaded to work a few acres in accordance with 'use as directed.' The demonstration farmer must do all the actual work himself. Therein lies the force of the argument. What he can do his neighbors will believe they can do. Each month specific instructions are sent to each demonstrating farmer. Each month, too, a local agent visits him and gives word-of-mouth instructions. Notice is sent to all the co-operating farmers to meet the agent on a given demonstration farm, where the crop and plans are exhaustively discussed. This is called a 'field school.' In these discussions it has been found with pathetic frequency that many small farmers had never fully complied with any of the essential rudiments of successful farming. Year after year they had gone on charging their perfectly avoidable failures to the land or the elements. One of the converts to the new farming thus frankly expressed himself at a public meeting in Alabama last year: 'I was born in a cotton-field and worked cotton on my farm for more than forty years. I thought no one could tell me anything about raising cotton. I had usually raised one-half a bale on my thin soil, and I thought that was all the cotton there was in it in one season. The demonstration agent came along and wanted me to try his plan on two acres. Not to be contrary, I agreed, but I did not believe what he told me. However, I tried my best to do as he said, and at the end

of the year I had a bale and a half to the acre on the two acres worked his way, and a little over a third of a bale on the land worked my way. You could have knocked me down with a feather. This year I have a bale and a half to the acre on my whole farm. If you do not believe it, I invite you to go down and see. Yes, sir; as a good cotton planter I am just one year old.' "

NEWS ITEMS

Mr. and Mrs. Norman Taylor are spending a few weeks in Santo Domingo in the interests of the New York Botanical Garden.

Dr. C. H. Shattuck, formerly associate professor of botany and forestry at Clemson College, S. C., has accepted a professorship in the University of Idaho.

Mr. W. W. Eggleston has been devoting several weeks to collecting and studying *Crataegi* in North Carolina, South Carolina, Alabama, Kentucky, and West Virginia.

Professor C. S. Hitchcock, of the Department of Agriculture, has recently returned from a summer spent in collecting and studying the grasses of the Yukon Valley, Alaska.

Mrs. Kellerman, widow of the late Professor William A. Kellerman, is offering for sale his valuable herbarium of flowering plants (60,000 specimens) and fungi (over 70,000 specimens).

At the Portland, Oregon, meeting of the Association of American Agricultural Colleges and Experiment Stations, Professor W. J. Kerr, president of the Oregon Agricultural College, was elected president of the Association.

The Gunnison tunnel, opened in Montrose County, Colorado, last September, by President Taft, diverts the course of the Gunnison River and provides sufficient water to irrigate 150,000 acres of land. This is the first project undertaken by the government reclamation service. The tunnel is six miles long, with a capacity of over 1,000 cubic feet a second.

Among the recipients of honorary degrees conferred at the inauguration of Dr. A. Lawrence Lowell as president of Harvard University, was Dr. John Christopher Willis, director of the Royal Garden at Ceylon, and a delegate from Cambridge

University. Dr. Willis has been giving a brief course of lectures at Harvard on some economic problems of tropical agriculture.

Dean H. H. Rusby made during the summer a two months' trip to the Pacific coast; Dr. Rusby attended the American Pharmaceutical Association at Los Angeles, aided Dr. Kebler (Bureau of Chemistry, United States Department of Agriculture) in inspecting the drug supplies of the western coast, and studied and collected indigenous drugs and economic plants for the College of Pharmacy.

A conference has been planned by Gifford Pinchot, United States Forester, to which are invited the heads of all universities, colleges, and schools in which technical forestry is taught. The conference which is to be held in Washington December 30 and 31 will consider the objects and methods of forest instruction, the organization and standards of educational work in the field of forestry, the coördination of the work of different institutions, and the needs of the Forest Service and other employers of forest graduates.

At the recent Darwin commemoration the honorary degree of D.S. was (according to *Science*) conferred upon the following botanists: Robert Chodat, professor of botany at Geneva; Francis Darwin, F.R.S., honorary fellow of Christ's College, and formerly reader in botany; Karl F. Goebel, professor of botany at Munich; Hermann Graf zu Solms-Laubach, professor of botany at Strassburg; Clement Timiriazeff, professor of botany in Moscow; Hermann Vöchting, professor of botany at Tübingen; Hugo de Vries, professor of botany at Amsterdam; and Charles René Zeiller, professor of paleobotany in the École des Mines, Paris.

The yearly winter meeting of the American Association for the Advancement of Science will be held in Boston, from December 27, 1909, to January 1, 1910. The sessions of the botanical section will convene under the Vice-Presidency of Professor D. P. Penhallow, and will alternate with the sessions of the Botanical Society of America, as at Chicago and Baltimore. An address will be delivered by the retiring Vice-President, Dr. H. M. Richards, of Barnard College, Columbia University, and there will be a symposium on the rôle of botanical gardens, as well as the usual papers.

TORREYA

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SOME AMERICAN BOTANISTS OF FORMER DAYS*

By John Hendley Barnhart

A hundred and twenty years ago, when Richard Pulteney had written his "Historical and biographical sketches of the progress of botany in England", he put into his preface these apt words: "In tracing the progress of human knowledge through its several gradations of improvement, it is scarcely possible for an inquisitive and liberal mind, of congenial taste, not to feel an ardent wish of information relating to those persons by whom such improvements have severally been given: and hence arises that interesting sympathy which almost inseparably connects biography with the history of each respective branch of knowledge." And it is as true as ever, that, if one would understand the progress of science, he must study the personality of the men whose labors have resulted in that progress.

Our theme this evening, "Some American botanists of former days", is a very limited one. The term "American botanists" is intended in its narrow sense, as referring only to those whose scientific work has been accomplished, at least in part, within the bounds of the United States as they were before our recent period of expansion. And when we say "botanists of former days" we must in fairness omit all reference not only to workers now living but to all who would be living if they had not met with premature death.† By the latter limitation we exclude all specialists in

* Paper presented at the meeting of the Torrey Botanical Club, October 12, 1909. Reprinted with slight alterations from the Journal of the New York Botanical Garden, Vol. X. No. 116, August, 1909.

† As a matter of fact, no man is mentioned who did not die more than five years ago; and, if all of those mentioned were still living, the youngest would be about seventy years old.

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plant morphology and physiology, fields of study which have seen their entire development, as far as this country is concerned, within the memory of the living. Even thus limited, the number of botanists worthy of mention on an occasion such as this is so large that we must necessarily omit altogether some who might reasonably be looked for; and we may as well admit that in doubtful instances our choice has been influenced by the facility with which we are able to illustrate* our remarks.

The earliest knowledge of North American plants was derived from the accounts of observant travelers and explorers, and from specimens and seeds carried to Europe by them and by traders. Living plants and seeds were grown in European gardens, and it was from material raised in this way that most of the early technical descriptions of American plants were drawn. The collectors possessed little or no botanical knowledge, and the scientists who studied the collections can not be classed as "American" in any sense.

The first settler of whose scientific attainments as a botanist we have positive evidence, was John Banister, a missionary in Virginia, who lost his life by falling from some rocks while on one of his collecting expeditions. In 1680, Banister sent a list of Virginian plants to John Ray, of England, who published it as an appendix to his Historia Plantarum in 1688. Fifty years had elapsed, however, before the appearance of a work dealing exclusively with North American plants, and nearly a century before the first botanical work was published in North America.

John Clayton, who came from England to Virginia in 1705, and was for 51 years clerk of Gloucester County, prepared a scholarly work on Virginian plants. Of course he lacked facilities for publication, and for the comparison of his plants with those previously described; his specimens and manuscripts were sent to Holland, where the flora was published under the editorship of Gronovius, whose blunders are to be found on nearly every page. Clayton's botanical exploration covered all of eastern Virginia, and extended through many years; even the year before his death, when he was about 87 years of age, he made a botanical tour through Orange County. All of the care-

* The paper was illustrated with lantern slides.

fully prepared manuscripts and collections left by him were destroyed by fire a few years later, during the Revolutionary War.

While Clayton was pursuing his explorations in Virginia, Cadwalader Colden was studying the flora of his great three-thousand-acre estate, "Coldenham", in the colony of New York. Dr. Colden was a very busy man, nearly always holding some public

FLORA VIRGINICA

Exhibens

PLANTAS

Quas

V. C.

JOHANNES CLAYTON

In

VIRGINIA

Observavit atque collegit.

Easdem

Methodo Sexuali disposuit, ad Genera propria retulit, Nominibus specificis insignivit, & minus cognitas descripsit

JOH. FRED. GRONOVIUS.

PARS SECUNDA.

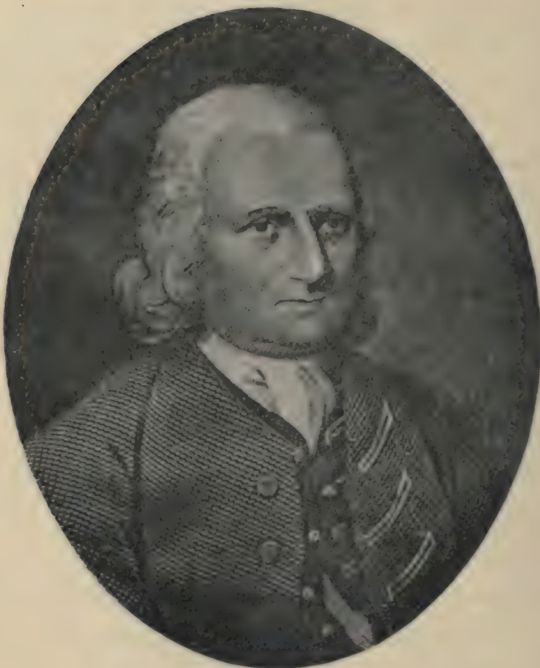
LUGDUNI BATAVORUM,

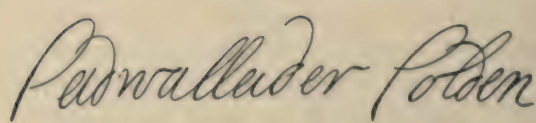
Apud CORNELIUM HAAK, 1743

FIRST PAGE OF BANISTER'S CATALOGUE.*

office of importance, and at one time lieutenant-governor of the colony of New York; yet, with the aid, no doubt, of his gifted daughter, he found time to prepare a careful account of the native plants of Coldenham, and sent this to Linnaeus, who published it in the proceedings of the royal society of Upsala. This was the earliest local flora of any part of the present state of New

* This illustration was provided with the aid of the Catherine McManes fund.





CADWALLADER COLDEN, 1688–1776

York. The daughter, Jane Colden, commenced the preparation of a remarkably accurate flora of New York, of which the completed portion is preserved, in manuscript, in the Department of Botany of the British Museum.

Banister, Clayton, and Colden, as well as other early workers on the flora of North America, such as Catesby, Garden, Kalm, Vernon, and Kreig, were all Europeans by birth. The first native American botanist was John Bartram, a Quaker, who was born near Philadelphia in 1699. He published but little, and that little furnishes very slight evidence of his botanical attainments; but he was a correspondent of Collinson, Gronovius, and other famous European botanists of his day, and by the number and accuracy of the observations contained in his letters seems to have deserved their admiration. He traveled throughout eastern North America, from New York to Florida, collecting particularly seeds for his Old-World correspondents; but he is best remembered from the fact that he established, near Philadelphia, about 1730, the first botanic garden in America, and into this garden he gathered representatives of the largest possible number of native American plants. It was a small affair (the entire property comprised only five acres), and a part of the limited space was occupied by the house, built by his own hands; but the garden was a remarkable project indeed for those days, and is known to have contained many choice specimens.

William Bartram, son of John, is perhaps better known as a botanist, because of the fact that his account of his extended travels in the southern Atlantic states was published, and contains many important observations upon the plants of the regions explored by him. He maintained the garden established by his father, and after his death the property remained in the hands of owners who were deeply concerned in its preservation, for many years. During a short period of neglect, serious damage was done to the old garden, but within the past twenty years it has become the property of the city of Philadelphia, and is now a city park. Its collection of trees and shrubs has always been a notable one, and the old house is still in an excellent state of preservation.

The second American botanic garden in North America was also near Philadelphia, and was established in 1773 by Humphry Marshall, a first cousin of John Bartram and, like him, a Quaker. The old garden has long since passed into a state of decay, but the house, built by Marshall with his own hands in 1773, is still in an excellent state of preservation. Humphry Marshall has the distinction of having written the first botanical work ever published in the United States, an account of our native trees and shrubs, printed at Philadelphia in the latter part of the year 1785.

One of the most remarkable of the early American botanists was Thomas Walter, a native of Hampshire, England, who went to South Carolina when a young man, married there, and settled on the banks of the Santee River. How he became interested in botany, how he was able to carry on his botanical work in such complete isolation from the rest of the scientific world, is quite unaccountable. However accomplished, it is an indisputable fact that he prepared a clear, succinct, and remarkably complete flora of the region about his home, which was published in London by John Fraser in 1788. Fraser was a collector who visited the southern states repeatedly, the first time as early as 1785; he was a personal friend of Walter's, and took the manuscript back with him upon his return from one of his earlier trips. Walter died in the same year in which his flora was published, less than fifty years of age, and was buried in the garden adjoining his home, where he is said to have cultivated many of the plants described in his Flora Caroliniana. His herbarium is preserved in the Department of Botany of the British Museum.

Our attention is now claimed by a small group of men who played an important part in the development of American botany. They were born, and died, in foreign lands, but they spent years in the active botanical exploration of the United States as then limited, and their labors resulted, in each instance, in the publication of a monumental work upon the North American flora.

André Michaux, a Frenchman, already well known for his botanical travels in Europe and the Orient, landed at New York late in 1785, and spent more than ten years in America, traveling throughout the known parts of the country from Hudson Bay to

Florida, and as far west as Kentucky and the Cumberland settlements. On his travels he was sometimes accompanied by his son, François André, who was only fifteen years old upon their first arrival. During all these years, although for a part of the

FRANÇOIS ANDRÉ MICHAUX, 1770-1855
[Daguerreotype, 1851]

time he was engaged upon a political mission for the French government, Michaux seems to have had in mind the accumulation of material for a general flora of North America, and when he

returned to France in 1796 he carried with him an herbarium of North American plants such as had never before been brought together. His flora was edited by the famous French botanist, L. C. Richard, and published at Paris in 1803; meanwhile the man whose labors had made this great undertaking possible of accomplishment had lost life on the island of Madagascar.

The son, François André Michaux, revisited America in the years 1801–03, traveling through the then extreme west, Ohio, Kentucky, and Tennessee. He afterwards published an elaborately illustrated history of the forest trees of North America, and several other works relating to our flora; and, at his death, in 1855, he left to the American Philosophical Society a fund for the development of American arboriculture.

Frederick Pursh was a native of Saxony. He came to America in 1799, and spent nearly twelve years here, engaged much of the time in botanical collecting trips. He traveled principally on foot, and without companionship save perhaps that of a dog. According to his own statements, he was as far to the northeast as New Hampshire and as far south as the mountains of North Carolina, but as far as collateral evidence is concerned there is no proof that he was farther northeast than Vermont or farther south than southern Virginia; and, unfortunately, the reputation of Frederick Pursh for strict veracity is not of the best. In the course of his travels, however, he made the acquaintance of nearly all the botanists then living in this country, and was permitted to examine all the herbaria then existing here; and, upon his return to Europe, he found in England, where he made his home, several fine herbaria of North American plants. In England, in 1814, he published his flora of North America, which was the second (and last successful) attempt to comprehend in a single work descriptions of all known North American flowering plants. A few years later Pursh began the exploration of Canada, with a view to the preparation of a descriptive Canadian flora, but before this was accomplished he died, at Montreal.

Thomas Nuttall was an Englishman who, when he came to America in 1808, at the age of twenty-two, had no knowledge of botany, and received his first lessons in that science from Pro-

fessor B. S. Barton, to whom he had applied for information concerning an unfamiliar plant. Yet he became a great enthusiast in the pursuit of botanical knowledge, and only ten years later he published his famous work on the genera of North American plants, which gave him a place in the first rank of the botanists of his day. Meanwhile he had made excursions to various parts of the country east of the Mississippi, and one far up the Missouri, utilizing the inclement winter seasons for working up his collections at Philadelphia. Nuttall continued botanical work in this country until 1841, when he returned to England, where he spent his remaining years, with the exception of a brief visit to Philadelphia in the winter of 1847–48.

By the time Nuttall's work on the genera of North American plants appeared, in 1818, there had sprung up two vigorous centers of botanical activity in this country, one at Philadelphia, the other at New York. In discussing these, we shall find it convenient to take up the Philadelphia group of botanists first. This was doubtless directly influenced by the earlier work of the Bartrams and of Marshall in that vicinity.

Henry Muhlenberg was a Lutheran clergyman, born in Pennsylvania, but educated in Germany. He did not take up the study of botany until he was nearly thirty years old, about 1782 or later. His home was at Lancaster from this time until his death in 1815, but he is mentioned here because his botanical associations were chiefly with the younger workers of Philadelphia. By his thorough work, his publications, his collections, and his correspondence with European botanists, he did much to advance the knowledge of our flora.

Dr. Benjamin Smith Barton, a native of Pennsylvania, who had received his medical education at Edinburgh and Göttingen, became a professor in the University of Pennsylvania in 1790, at the early age of twenty-four, and continued to occupy this chair until his death twenty-five years later. His position gave him much prestige, and his contributions to the advance of American botany are to be measured less by his published work than by the influence of his botanical lectures, and the sympathy and financial support given by him to other students, such as Pursh

and Nuttall. His nephew, Dr. William P. C. Barton, also became a well-known botanist.

One of Dr. Barton's students, whose interest in botany seems to have been first aroused, however, by Humphry Marshall, was Dr. William Baldwin. Dr. Baldwin had already visited China before he received his professional degree in 1807, and within the next ten years he traveled extensively in the southern states, and as a surgeon in the United States Navy visited various South American ports. In 1819 he joined a government expedition for the exploration of the upper Missouri, and died before they were well under way. His published papers were few, but his notes and memoranda were very useful to contemporary workers, and his memory is kept green by the publication of a volume of his letters by his friend, Dr. Darlington.

Dr. William Darlington was another physician who enjoyed the inspiration of Barton's lectures, and in spite of his arduous labors as a member of Congress and in various other public and semi-public positions, devoted much time throughout a long life to botanical study. His flora of his home county of Chester, which went through three editions, was a model local flora which in some respects has never been surpassed. He was deeply interested in such subjects as those we are discussing this evening, and it was through his efforts and under his editorship that the literary relics of Bartram, of Marshall, and of Baldwin, were rescued from oblivion.

Lewis D. de Schweinitz was a Moravian preacher, a native of Bethlehem, Pennsylvania, where he spent most of his life. He was educated in part, however, in Austria and Germany; although his study of botany was begun before he left America, his first published work was in collaboration with Professor J. B. Albertini, of Niesky, in upper Lusatia. His chief interest was in cryptogamous plants, particularly fungi, and he was the first American specialist in this group of plants. Although his published works were few, they were fairly voluminous, and are of great importance.

The leader of the New York group of botanists was Dr. Samuel L. Mitchill. He was a naturalist of broad interests, and never published any botanical work of consequence, yet he ex-

erted such a remarkable influence upon the young men he gathered about him that no student of the history of botany in this city could fail to recognize in him a great pioneer. When a handful of young enthusiasts gathered in 1817 to organize the Lyceum of Natural History, now the New York Academy of Sciences, the only candidate considered for president was their beloved professor, Dr. Mitchill, and he retained his interest in the institution until his death. At various times Congressman, Senator, and College Professor, his is a striking figure in the history of natural science in this vicinity.

A contemporary of Dr. Mitchill was Dr. David Hosack, a New York boy, a graduate of Princeton, who pursued his medical studies in Scotland and England, and while there acquired a taste for botany, and received some training in that science from William Curtis and Sir James E. Smith, the famous English botanists. Soon after his return to New York he established the first botanical garden in this city, a short distance north of where the Grand Central Station now stands. A hundred years ago this Elgin Botanic Garden was one of the show places of the city; in 1811 it was sold by Hosack to the State of New York, and three years later was granted to Columbia College. The grant did not require Columbia to maintain the Garden as such, and it was soon diverted from its former uses; with the later marvellous rise in value of real estate in that vicinity, it became the foundation of Columbia's prosperity.

Among the founders of the Lyceum were several young men particularly interested in botany, among them LeConte, Eddy, Knevels, and Torrey. Of this number Dr. John Torrey became most renowned in after years. His first important botanical work was performed as a member of a committee appointed by the Lyceum to prepare a flora of the region around New York City. This report, prepared chiefly by Torrey, was afterward published, and was the first of a long series of important works, which won for Torrey universal recognition as the foremost American botanist of his day. He was for many years a professor in the College of Physicians and Surgeons, and died at the age of 76, universally beloved.

As Torrey had been one of the young men drawn together by the magnetic personality of Dr. Mitchill, for the establishment of the Lyceum, so he was in turn the center of attraction for the group who, nearly sixty years later, founded the Torrey Botanical Club. The leading spirit in this later movement was William H. Leggett, who acted as editor of the Bulletin of the Club from its commencement in 1870 until his death in 1882.

One of the early botanists of the Lyceum was Professor C. S. Rafinesque, and we may as well refer to him at this point, although by nature and by fate he was a cosmopolitan. His father was a French merchant, his mother was of German extraction, he was born in a suburb of Constantinople and spent most of his early years in Italy. He was a precocious child, becoming familiar with various languages and more or less acquainted with various sciences at an early age. As a young man he spent several years in America; then several years in Sicily; in 1815 he returned to the United States, where he spent the remainder of his life. He was in many ways the most striking figure to be found in American botany; brilliant, but erratic; undervalued, misunderstood, and misrepresented by his contemporaries, yet deserving by his rashness and the superficiality of his work many of the harsh criticisms with which he was assailed. As professor in Transylvania University, he was the first resident botanist west of the Alleghenies. His later years were spent in Philadelphia, where he died in poverty and almost friendless. Most of his numerous publications might better never have been written, yet with the dross are occasionally to be found grains of pure gold, and the present generation is inclined to put a more just estimate upon the work of Rafinesque than has hitherto prevailed.

Amos Eaton was the first great popularizer of botany in this country, and in tracing back the history of any American botanist of the past century we are as likely as not to find that Eaton was, botanically speaking, his father or grandfather. Eaton was a teacher, and was always full of enthusiasm of such a contagious character that his pupils found it irresistible. Wherever he went he inspired others with the same interest in natural science that he felt himself. None of his predecessors

could be compared with him in this respect except perhaps B. S. Barton, and Barton's personality was cold and formal when compared with that of Eaton. His manual, prepared specifically to meet the needs of the amateur, was popular for many years, and went through eight editions. The last eighteen years of his life were chiefly occupied with labors incident to the establishment and administration of the Rensselaer Polytechnic Institute, at Troy. Among the many inspired by him was Mrs. Almira H. Lincoln, afterwards Mrs. Phelps, whose text-book did so much to popularize the study of botany.

At this time there was no group of botanists in New England comparable to those in Philadelphia and New York; yet at least two New England botanists of this period should be mentioned. One was Dr. Jacob Bigelow, author of a Boston flora which appeared in three editions. He was one of the most famous of Boston physicians, and lived to be nearly 92 years of age. The other was Professor Chester Dewey, well known for his work on the difficult genus Carex.

Another man who was doing remarkable work at about the same time was Stephen Elliott, of Charleston, South Carolina. Isolated from most other botanists, with meager facilities for the prosecution of scientific work, occupied much of the time with his duties as a member of the legislature of his state, he nevertheless published, at intervals, beginning in 1816, a descriptive flora of South Carolina and Georgia which challenges our admiration.

We now come to a new era in the development of American botany. Hitherto most American botanists had been interested in other natural sciences as well, and in so far as they had devoted their attention to botany they had covered essentially the same ground. Morphology and physiology were still in the background, but although taxonomy held the field, specialization was the order of the day.

The acknowledged leader of American botany during this period was Dr. Asa Gray. At first in New York, and later for many years at Harvard, he made a name for himself, as a man of sound scholarship, of broad culture, and of commanding person-

ality. He seems, however, to have been jealous of his own pre-eminence, and to have discouraged successfully every possible rival in his chosen field. Few indeed, during a period of many years, were the Americans who ventured to differ with him upon any botanical matter on which he had expressed an opinion. His assistant at Harvard in his later years, and his successor, was Dr. Sereno Watson, a man of similarly scholarly attainments.

In one line, however, Gray had a worthy rival. Alphonso Wood possessed neither the talents nor the advantages of Asa Gray, but his class-book of botany always disputed with Gray's manual the right to popular approval as a working reference book upon the flora of the northeastern United States. Nor was Wood's work patterned after that of Gray; its first edition appeared several months earlier, and its later editions covered a considerably larger field, while the author always persisted in giving clear expression to his own views. Dr. Alvan W. Chapman, on the other hand, who wrote the well-known flora of the southern United States, was an author in little more than name, the absolute authority of Dr. Gray being recognized throughout the work.

During the years when Dr. Gray monopolized nearly all of the work on the taxonomy of flowering plants in this country, there arose a number of specialists in plant-groups in which he took little interest — for he realized that it was impossible for one man to cover all the ground — who, as a rule, coöperated with him in their work. Among the specialists in groups of flowering plants were M. S. Bebb, who did notable work with the willows, having at his home in Illinois a remarkable salicetum where he was able to compare the various species in a living state; George Thurber, best known to botanists as a grass student, although most of his time was devoted to editorial work in agriculture; and George Vasey, also a specialist in the taxonomy of grasses, and for years the botanist of the United States Department of Agriculture.

In ferns, the one prominent name was that of Daniel C. Eaton, for thirty years professor of botany at Yale; he was a grandson of Amos Eaton, whose wonderful influence upon American botany

has been mentioned. Among moss students, we may refer to William S. Sullivant, who was the pioneer in the work upon this group of plants in this country, and Thomas P. James, who assisted Leo Lesquereux (of whom more later) in the preparation of the manual which is even now the only book of its kind for the identification of all then known American mosses. In the study of the Hepaticae, Coe F. Austin was the pioneer; his home, at Closter, New Jersey, was in a region peculiarly rich in its hepatic flora.

Among the specialists in Algae we may mention Dr. Francis Wolle, a Moravian clergyman, who published several books dealing chiefly with freshwater forms. Almost the only American student of lichens, for many years, was Professor Edward Tuckerman, of Amherst College. The most prominent mycologists of this period were Rev. M. A. Curtis, an Episcopalian clergyman, and Henry W. Ravenel, a planter, and since their work, as well as much of that of Schweinitz, was done in the southeastern states, the fungi of that region were better known forty years ago than those of any other part of the country.

As an example of the few palaeobotanical students of this period we may mention J. S. Newberry, geologist of several government exploring expeditions, state geologist of Ohio, and for twenty-four years professor in Columbia University. A unique position, as one who was at the same time a botanical horticulturist and a horticultural botanist, was occupied by Thomas Meehan, of Germantown, Philadelphia; his botanical work always betrayed his lack of scientific training, but contained much of permanent value.

The remarkable immigration to this country from central Europe during the thirties and forties, influenced largely by political conditions, had a pronounced effect upon American botany. Dr. George Engelmann, from Germany, became the pioneer of botanical work in the Mississippi valley, and established a botanical center at St. Louis which has been increasing in influence ever since. Dr. Leo Lesquereux, a Swiss, was for many years the foremost American student of fossil plants, and of mosses. Two men of German birth, Dr. Charles Mohr, of

Mobile, and Dr. Augustin Gattinger, of Nashville, became noted for their work upon the flora of their respective states.

In a discussion of American botanists, we must not overlook

CHARLES WILKINS SHORT, 1794–1863
(Daguerreotype, 1853)

those who are best known for field work, but of this class we can only mention a few. Perhaps the first person in this country to become noted for the excellence of the herbarium material distributed by him was Dr. Charles W. Short, of Kentucky. Dr.

Charles C. Parry is best remembered for his field work throughout the west, upon various government and private expeditions. H. N. Bolander and Thomas Bridges were among those who did notable work in the botanical exploration of California. But the prince of American plant collectors of former days was a modest Connecticut Yankee, Charles Wright, who devoted twenty years to work in the southwest, in Mexico, in China, and in Japan, and another ten years to the botanical exploration of Cuba.

Nor can we omit mention of those who, although busily engaged with other occupations, have found time to do valuable work upon the flora of the regions in which they have made their homes. Such a one, for instance, was Charles C. Frost, the shoemaker of Brattleboro, who had "more friends among the educated people of Europe than in his native village." Another such was John Williamson, of Kentucky, who with his own hands produced those beautiful etchings now so highly prized by American fern students.

The day of usefulness of amateur work in botany, such as that of Frost and of Williamson, has not passed. The limits of our topic forbid the mention of the names of the living, but even now there are farmers, and merchants, and professional men, who by devoting their leisure moments to serious study are notably advancing botanical science.

LOCAL FLORA NOTES — II

By Norman Taylor

Scheuchzeriaceae

1. *Triglochin palustris* L. There are no specimens of this from the area.* North American Flora, the manuals and other general works all credit this species with a range that includes at least the upper part of our area. Most of the local lists contain no mention

*The local flora range as prescribed by the Club's preliminary catalog of 1888 is as follows: All the state of Connecticut; Long Island; in New York, the counties bordering the Hudson Valley, up to and including Columbia and Greene, also Sullivan and Delaware counties; all the state of New Jersey; and Pike, Wayne, Monroe, Lackawanna, Luzerne, Northampton, Lehigh, Carbon, Bucks, Berks, Schuylkill, Montgomery, Philadelphia, Delaware, and Chester counties in Pennsylvania.

of the plant, but Hogsradt in his list of the plants found near Pine Plains, Dutchess Co., N. Y., says of it (in 1875) "very rare, only a single specimen in Sackett's Marsh." Has the locality any recent verification? The plant should grow in the Catskills but collections at hand do not show this.

Alismaceae

1. *Lophotocarpus spongiosus* (Engelm.) J. G. Smith. The most southerly point from which this plant has been collected is Hackensack River, N. J. In general works it is credited with a range from New Brunswick to Virginia. In Britton, Cat. of Plants of New Jersey, a single station, Camden, is cited. What is its distribution in New Jersey and northward? Has it ever been seen on Long Island?

2. *Sagittaria rigida* Pursh. As shown by the specimens in herbaria this plant is apparently more restricted in distribution than general works postulate it to be. So far as the local range is concerned it is not reported from north of Easton, Pa., or south of New Brunswick, N. J. This limitation of the range by our specimens is surely wrong. Stations north or south of these points will settle its local distribution.

3. *Sagittaria pubescens* Muhl. There are no specimens from the range in the collections. North American Flora credits it to New Jersey and the Handbook of the flora of Philadelphia and vicinity gives Bucks, Chester, and Northampton counties as stations. Specimens from any of these localities, particularly from New Jersey, are desired in order that its local distribution shall be permanently recorded in the club herbarium.

4. *Sagittaria cuneata* Sheldon. The local collectors are lacking in specimens of this. According to North American Flora it is found in Connecticut. Any specimens from this state or adjacent New York are desirable.

5. *Sagittaria Eatoni* J. G. Smith. We have no specimens from the range. North American Flora gives its general distribution thus "Massachusetts, Connecticut, and Long Island, New York." Smith * writes of seeing specimens from the shores

* Rep. Mo. Bot. Gard. 11: 150, 151.

of Long Island Sound. Has any one collected it recently from Long Island or Connecticut?

6. *Sagittaria lorata* (Chapm.) Small. There are no specimens from the range. General works report it from Connecticut to New Jersey, etc. The Catalogue of New Jersey plants gives numerous stations, all of which it is desirable to permanently record in the club herbarium.

Elodeaceae

1. *Philotria canadensis* (Michx.) Britton. Princeton, N. J., is the only station represented in the collection. With a general range including territory from Quebec to Virginia, this localization is obviously untrue. Specimens from throughout the range are desired. So far as known the staminate flowers of this species are wanting, while in the other species they are known to occur. Has any one ever seen a staminate flower?

2. *Philotria Nuttallii* (Planch) Rydb. There are only three stations represented in the material at hand, and they are all near New York City. Generally speaking this species is more common than the preceding and its distribution within the range more diversified than the collections show.

Hydrocharitaceae

1. *Limnobium Spongia* (Bosc) Rich. There are no specimens from the range. In the Cat. Pl. New Jersey is the following record: "Monmouth [Co.]: Swimming River, rare. — Knieskorn. Not recently collected, and not seen by me from the State." The general range given in North American Flora is from New Jersey and Ontario to Florida, etc. Has anyone recent specimens from any part of our range?

Araceae

1. *Arisaema Stewardsonii* Britton. The only specimen from the range was collected at Tannersville, Pa. Letters and notes are extant going to show its occurrence at other stations but there are no specimens to substantiate these claims. Recent notice of it at Plainfield, N. J., again unaccompanied by speci-

mens, may be grounds for assuming a wider distribution for *A. Stewardsonii* than is now shown by our material.

2. *Arisaema pusillum* (Peck) Nash. The only two specimens of this little known species were collected at the New York Botanical Garden and at Hewlet, L. I. Has any one been able to trace its distribution beyond that called for in the manual, viz., "Sunny bogs, southern N. Y."? It seems to be a very localized plant, or it may be a mere form of the widely dispersed *A. triphyllum* (L.) Torrey.

Lemnaceae

1. *Spirodela polyrhiza* (L.) Schleid. There are no specimens from the territory that lies north of New York City. A record exists of its being found at Pine Plains, Dutchess Co., N. Y. It should be found throughout our range but no permanent record, except those given above, is extant.

2. *Lemna trisulca* L. This almost cosmopolitan species is known only from West Goshen, Conn., so far as our range is concerned. Any specimens that will show its true distribution in the area will be welcome.

3. *Wolffia Columbiana* Karst. No specimens at hand were collected north of the region about New York City. With a general distribution of "Mass. to Ont., N. J., S. Car.," etc., it seems that our material does not adequately represent the distribution of the species within the range.

Xyridaceae

1. *Xyris fimbriata* Ell. The only specimens are from Atsion and Egg Harbor, N. J. In the Cat. of N. J. plants at least six other stations are given. From where else in New Jersey has this plant been found? So far as our range is concerned the plant occurs only in southern New Jersey, but our specimens fail to show how far north the plant is to be expected.

2. *Xyris montana* H. Ries. The most northerly station represented in the collections are among the Pocono Mountains of Pennsylvania. Between this and the southerly tip of New Jersey there is an hiatus. Where in the northern part of the pine barren region may the plant be found? Has it ever been found north of the Pocono country?

ERIOCAULACEAE

1. *Eriocaulon Parkeri* Robinson. In the appendix to the second edition of Britton's Manual, page 1067, this plant is reported as growing in tidal mud at Camden, N. J. Has any other station been discovered or is the plant a localized affair?

NEW YORK BOTANICAL GARDEN

REVIEWS

Ramaley's Wild Flowers and Trees of Colorado *

Wild Flowers and Trees of Colorado recently issued by Professor Ramaley, of the University of Colorado, is most attractively illustrated with line drawings, and a varied and large number of half tones of plants and of plant habitats. The book, issued as the "only popular work of any kind dealing with Colorado plants", must surely serve the author's purpose: to interest the people of Colorado in its plants.

Believing that the trees are "the best plants to begin with in a study of vegetation", half of the book is devoted to forest formations and forest trees; a very simple key based upon leaf characters is included. The flowers cannot, of course, be exhaustively dealt with in the space allowed; but both text and illustrations are interesting, and some knowledge of plant names, and of plant ecology may be acquired in a very pleasant way.

JEAN BROADHURST

Jennings's Botanical Survey of Presque Isle †

This important contribution to phytogeography deserves more than a passing notice, because it is a sample of a carefully prepared and a thoroughly digested piece of field exploration. The numerous full-page illustrations and charts which are reproduced in this bulky publication add very much to its value to the

* Ramaley, Francis. Wild Flowers and Trees of Colorado. A. A. Greenman, Boulder, Colo. Pp. 78. Illustrated. (For sale by G. E. Stechert & Co., New York.) $1.25.

† Jennings, Otto E. A Botanical Survey of Presque Isle, Erie County, Pennsylvania. Annals of the Carnegie Museum, Vol. V, Nos. 2 and 3, 1909. Pp. 289-421, pl. XXI-LI with 4 text figures.

student of botany and physiography. Under the caption "the physiographic origin of Presque Isle" Jennings describes the changes which have been produced in the conformation of the shore and hills by the slow action of the currents and waves of Lake Erie. He shows by a series of figures and in his description how the evolution of the island has taken place, the United States hydrographic charts made at various intervals in the past affording important data upon which to base a survey. The author shows how the development of the climax vegetation has been influenced by the physiographic changes that have taken place in the island. Under the heading "ecological structure and pevelopment of the vegetation" is presented a detailed account of the plant formations, and finally, a list of the 420 species, 18 varieties, and 1 hybrid collected at various times on Presque Isle. The reviewer believes that Jennings has subdivided the natural vegetation into too many formations. For example, the Lagoon-Marsh-Thicket-Forest Succession has been subdivided into the Populus-Salix Formation, the Potamogeton Formation, the Typha-Scirpus Formation, the Sabbatia-Linum Formation, etc. The treatment would have been much simplified if all of these formations (which are not formations as the reviewer understands them) had been grouped under one, viz., "the lake formation", and if the smaller areas of vegetation had been termed associations, or circumareas. Then, instead of describing the vegetation of each lagoon, separately and categorically, much space might have been saved and condensation made possible by referring to the lagoon where such and such a type of vegetation occurred naturally. These remarks are not made in a fault-finding spirit, but merely to suggest points where forthcoming papers of a similar character might be improved without impairing the scientific value of the work.

John W. Harshberger

PROCEEDINGS OF THE CLUB

October 27, 1909

This meeting was held at the New York Botanical Garden and was called to order at 3:30 P. M. by Dr. E. B. Southwick.

About forty persons were present. After the reading of the minutes of the preceding meeting, the scientific program was presented, the first contribution being made by Mrs. N. L. Britton, who spoke on "Arctic Mosses." The speaker's remarks were based on studies of mosses sent from the American Museum of Natural History to the New York Botanical Garden for determination. They were collected by Comm. Robert E. Peary in Grant Land in 1902, and by Dr. L. J. Wolf at Wrangle Bay, Lincoln Bay, and Grant Land in 1906. The Peary collection includes 62 bryophytes, of which 57 were mosses, representing 24 genera, and 5 were hepatics.

Specimens of flowering plants were also exhibited which have recently been acquired by the New York Botanical Garden through the courtesy of the Peary Arctic Club from the American Museum of Natural History.

The collection consists of herbarium specimens made on the late expedition of Comm. Peary to the North Pole and were collected mostly by Dr. J. W. Goodsell. While some of these were obtained on the northern coast of Labrador, the majority were collected on Grant Land, in the northern portion of Ellesmere Land, an island off the coast of Greenland. One of the packages contained specimens from perhaps the most northern locality where flowering plants have ever been found, while another is from Etah, the most northern habitation of man.

Since the subject of mosses was the principal topic of the hour, Dr. Murrill referred briefly to the genus *Dictyolus*, the species of which are found on living mosses. This genus belongs to the Chanterelleae, a tribe of gill-fungi, and there are only two species known in North America, *D. muscigenus*, occurring from Greenland to South Carolina, and *D. retirugus*, known from Greenland, Alaska, Minnesota, and California. Both species are small and thin, grayish or brownish in color and have folded-like gills. *D.*

muscigenus may be recognized by its distinct stripe and dichotomous gills, while *D. retirugus* is sessile or subsessile with branched, reticulate gills.

Dr. N. L. Britton spoke of the three genera of Cactaceae, *Carnegiea*, *Pachycereus*, and *Cephalocereus*, and showed specimens of their flowers. The genus *Carnegiea*, dedicated to Mr. Andrew Carnegie and formerly known as *Cereus giganteus*, consists of a single species. Some of these plants attain a height of sixty feet and branch at from twelve to twenty feet above the ground. The flowers are funnel-form with a nearly cylindric tube, bearing a few broad triangular scales. *Pachycereus* blooms at a different season from *Carnegiea* and the perianth-tube is clothed with woolly hairs and bristles.

Cephalocereus which has many representatives in the West Indies and some in Mexico, derives its name from the fact that the top of the plant is hairy. At Key West, Florida, there is a colony of *Cephalocereus keyenses* which is related to some of the Cuban and Bahaman species. It is the only locality where this species is known to exist. As it is growing here on a Government reservation, it will most likely be preserved.

Mr. Roland M. Harper told of his experiences in the south from July, 1908, to July, 1909. A few weeks were spent at the Biltmore Forest School, North Carolina. Specimens were observed here of *Helonias bullata* and *Dalibarda repens* which are not listed in Small's Flora of the Southeastern United States. The former was reported several years ago by F. E. Boynton, while the latter was noticed by Dr. Homer D. House.

Six weeks were spent in Georgia particularly in the vicinity of Pine Mountains and among the sand-hills of the fall line region, where he found *Chamaecyparis thyoides* which has not previously been reported from the state. Specimens of *Chrysopsis pinifolia*, discovered by Elliott in 1815, and known only from one county, were collected and also a twining *Bartonia*. Together with a party of geologists, Mr. Harper made a trip of 260 miles on the Warrior and Tombigbee Rivers in Alabama, which occupied a period of ten days. Here he collected an *Equisetum* which resembles *E. arvense*, but is several hundred miles out of the range

of that species. While in Florida studying peat for the State Geological Survey, he found several interesting plants, *Spartina Bakeri* which is very common but not mentioned in any flora, and an arborescent *Serenoa serrulata*, some plants of which attained a height of ten feet, and an undescribed species of *Prunus*. Mr. Harper explored the southern end of the Everglades following about the same route as that taken by Dr. Britton in 1904 and Dr. Small in January of this year.

After the scientific communications, Mr. Ernest D. Clark, 401 West 117th Street, New York City, was elected a member of the Club.

Dr. Southwick reported the finding of *Viola pedata* in flower, October 25.

Adjourned.

PERCY WILSON,
Secretary

NOVEMBER 9, 1909

The meeting was held at the American Museum of Natural History with Vice-president Barnhart in the chair. Eighty-nine persons were present.

The scientific program of the evening consisted of a talk by Dr. Marshall A. Howe on "Some Floral and Scenic Features of Porto Rico." This was a semi-popular account of some of the more striking features of the native and introduced flora of the island and was illustrated by about a hundred lantern-slides, some of which showed, incidentally, many interesting topographic and scenic details of the Porto Rican mountains and sea coast. Special attention was given to the native palms and their economic uses. The photographs shown included, also, several of the cacti, which are much in evidence in certain places along the southern shore of Porto Rico and on the adjacent island of Culebra. In striking contrast with the xerophytic vegetation of the southern slopes are the mesophytic forests, now, unhappily, of very limited extent, on two or three of the highest mountains. The soil of the island is or has been very nearly all under cultivation, but in addition to the two or three comparatively small forested areas, there are, here and there, in various parts of the

island, rocky hills where the native vegetation may be found under very nearly natural conditions. The sugar, coffee, and tobacco industries were also discussed and illustrated by the speaker.

Adjourned.

PERCY WILSON,
Secretary

OF INTEREST TO TEACHERS

THE HIGH SCHOOL UNIT IN BOTANY

The report of the meeting of the committee of the North Central Association of Colleges and Secondary Schools appointed to define the unit in botany for the North Central Association of Colleges and Secondary Schools has not been given in TORREYA, although the meeting was held last June. The committee consists of over twenty members, and includes seven college or university professors, one city school superintendent, one normal school representative, and thirteen high school teachers.

A full year's work is required to fill the college entrance requirements; the year being defined as the equivalent of 180 periods of 45 minutes each, "in the clear," for the class room; double laboratory periods, which count as one recitation period, being recommended at least twice a week. The second year of high school is the earliest year for botany approved by the committee. It was decided that the high school course should include plant physiology, plant ecology, including field work, and work with the "lower forms" or cryptogams as well as the leading families of seed-bearing plants.

The informal discussion which followed the meeting suggests the following as the minimum preparation for the well-equipped high school teacher of botany: At least two years of botanical study including the morphology of the lower and higher plant forms, plant physiology, ecology, including a thorough knowledge of the flora in the region where taught, plant diseases, and a general course in bacteriology. Some work in zoölogy and physiography is also considered essential.

Thousands of acres of valuable timber land were destroyed by a forest fire in November in the region near Harper's Ferry. The states affected were Maryland, Virginia, and West Virginia.

Burned areas, the "natural" desert, and flooded districts have all been the subject of government investigation and experimentation; this year Pikes Peak adds another regional type to the list covered in experimenal forestry.

The reforestation of burned lands is being studied by the United States Forest Service in the Olympic National Forest in Washington. This forest — the scene of three severe fires — is one of those in which the burned area is so large that actual seed planting is necessary. Douglass fir (*Pseudotsuga Douglasii* Carr.), a tree common elsewhere in the state, has been selected for the test.

Pennsylvania, through the influence of the American Civic Association, has passed an act permitting the cities of the state to establish municipal forests. In many instances, cities may thus conserve and protect the water supply, promote the well-being of the citizens, and increase the municipal revenues. The cities, by the new law, are required to secure the approval of the State Commissioner of Forestry before buying the land; and the commissioner is required to make rules for the administration of such preserves.

K. F. Kellerman and T. R. Robinson (Bureau of Plant Industry) have recently conducted some experiments with nitrifying bacteria in North Carolina soils, which lead them to state that "nitrification, nodule formation upon certain species of legumes, and the litmus reaction are correlated." The results obtained, however, sustain the point (previously noted in TORREYA in the abstract of similar work by Stevens and Withers) that nitrification is at a rather low ebb in North Carolina soils; yet nitrifying bacteria are generally present, and if supplied with suitable food would undoubtedly soon multiply sufficiently to cause a normal rate of nitrification.

The New York *Tribune* in a recent editorial remarks that in the enthusiasm for the policy of conserving natural resources many of the "most ardent advocates appear to have lost sight of the fact that, apart from the preservation of the forests, the entire movement lacks legal sanction, and that action by Congress is essential to its prosecution. The President has indicated his purpose to retain title to water rights, for instance, 'until the Congress shall have had an opportunity to act.' That opportunity will come with the approaching session, and there is grave question if Mr. Taft, earnest advocate of the movement though he be, will feel warranted in withholding from settlement lands containing water power after the coming session unless Congress acts affirmatively. Congress has never conferred on the Executive specific authority to withhold such lands, and it is only on the ground that a new problem has arisen that the President is now denying would-be settlers access and title to them." Though conservationists have "a sympathetic President, there is hard work for them to do in Congress. It is there that the test will come. Practically all the work done thus far is preliminary. No further step can be taken without definite legislative authority. Can Congress be induced to grant it?"

NEWS ITEMS

Mr. Charles E. Temple (A.B., Nebraska, 1906; A.M., 1909) has been made instructor in botany at the University of Michigan.

Mr. T. G. Bunting (B.S., Ontario, 1907) has been appointed instructor in horticulture at the New Hampshire College of Agriculture and the Mechanic Arts.

Professor Simon Schwendener, of the University of Berlin, will retire from his university duties, including the directorship of the University Gardens, this semester.

Dr. and Mrs. Howe sailed November 27 on the S. S. "Tagus" for Colon; they will spend five or six weeks collecting and studying the marine algae of the Panama region.

Professor Josephine E. Tilden, of the University of Minnesota,

has been given leave of absence for a year for botanical research in New Zealand. Her courses at the University are being given by Mrs. Frederic E. Clements.

Professor William Bateson, who lectured recently in the United States on variation and heredity, has resigned the chair of biology in the University of Cambridge and accepted the directorship of the John Innes Horticultural Institution at Merton, Surrey.

The Field Museum of Natural History (Chicago) has recently secured the herbarium of Dr. J. T. Rothrock, which, as Dr. Rothrock was the botanist of the survey of the territories and an intimate of Dr. Asa Gray, Dr. Torrey, Dr. Thurber, and other early botanists, contains a large number of the types and co-types of western North America.

The sixty-first meeting of the American Association for the Advancement of Science, and the eighth of the "convocation week" meetings, will be held in Boston, December 27, 1909, to January 1, 1910, at the invitation of Harvard University and the Massachusetts Institute of Technology. The usual reduced railroad fares are offered. At ten o'clock, December 27, Dean W. C. Sabine, representing the President of Harvard University, and President R. A. Maclaurin, of the Massachusetts Institute of Technology, will deliver addresses of welcome, which will be answered by the President, Dr. David Starr Jordan. Tuesday afternoon Vice-President Richards will give his address: "The Nature of Response to Chemical Stimulation." About twenty-five affiliated societies are to hold meetings in Boston; among them are the Sullivant Moss Society, the Botanical Society of America, and the Society of American Bacteriologists.

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New names and the names of new genera and species are printed in **boldface** type.

TORREYA

A MONTHLY JOURNAL OF BOTANICAL NOTES AND NEWS

JOHN TORREY, 1796-1873

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

JEAN BROADHURST

Volume X

NEW YORK

1910

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ERRATA, VOLUME 10

Page 5, 10th and 21st lines, *insert* period *after* Marsh.

Page 5, 10th and 18th lines, for *prinus*, read *Prinus*.

Page 5, 11th line, *insert* period *after* Wang.

Page 5, 14th and 21st lines, *insert* period *after* Mill.

Page 6, 11th line, *insert* period *after* Marsh.

Page 7, 3rd line from bottom, *insert* period *after* Benth.

Page 8, 5th line from bottom, for *moscheutos*, read *Moscheutos*.

Page 8, 4th line from bottom, *insert* period *after* Mill.

Page 9, 11th line, *insert* period *after* Marsh.

Page 9, 12th line, *insert* period *after* Wang.

Page 9, 14th and 18th lines, *insert* period *after* Mill.

Page 9, 17th line, for *prinus*, read *Prinus*.

Page 33, 8th line from bottom, for *Pinus*, read *Prinus*.

Page 33, 15th line, for *virginensis*, read *virginiensis*.

Page 34, 21st line, for *virginia*, read *virginiana*.

Page 36, 8th line, *insert* comma *after* who.

Page 38, 13th line, for *insignia*, read *insignis*.

Page 39, 10th line, *for* ony, *read* any.

Page 59, 3rd line from bottom, after clavatum, *read* § *for* ‡.

Page 59, 1st line of footnote, *for* highe, *read* higher.

Page 63, 4th line from bottom, after *officinalis*, read †, footnote * on page 64.

Page 69, 11th line, *for* Hermann, *read* Herrman.

Page 81, 13th line from bottom, for *Balticus*, read *balticus*.

Page 83, 9th line, *for Clorosperma*, read *Chrosperma*.

Page 87, last line, *insert* comma *after* bees.

Page 91, 18th line, *omit* comma *after* L.

Page 112, third line, *insert* comma at end of line.

Page 124, 14th line, *for* ' read " .

Page 124, 16th line, *for* Pierce, *read* Peirce.

Page 126, 13th line, for *newtoni*, read *Newtoni*.

Page 145, 14th line, for *Philadelphicum*, read *philadelphicum*.

Page 149, at ends of 15th and 17th lines, *transpose* hyphen *and* period.

Page 180, 18th line, *insert* of *before* Penicillus.

Page 192, 7th line, *insert* comma *after* Tennessee.

Page 194, 5th line, for *glaucaphylla*, read *glaucophylla*.

Page 214, 10th line, *for* employe, *read* employé.

Page 219, 8th line from bottom, for *Noveboracensis*, read *noveboracensis*.

Page 226, 9th line, *for* (March), *read* (Marsh.).

Page 230, 1st line, *for* **Caesariense,** *read* **caesariense.**

Dates of Publication

No. 1, for January	Pages 1–28	Issued	January 29, 1910
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No. 3, March	53–76		March 31, 1910
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TORREYA

January, 1910

Vol. 10 No. 1

THE VEGETATION OF THE NAVESINK HIGHLANDS*

By John W. Harshberger

The Highlands of Navesink, or, as they are sometimes called, the Atlantic Highlands, occur in the northeastern part of coastal New Jersey and are found as a projecting peninsula between Sandy Hook Bay on the north and Navesink River on the south. The deposits which constitute the highlands are mostly of Cretaceous age and some of the strata are fossil bearing. The strata consist of quartz sand, green sand, marls, and ferruginous red sand, the latter nearly one hundred feet in thickness. Some of the more typic layers belong to the Marl Series (Navesink Marl) of the New Jersey geologists. This series of deposits is, on the whole, more resistant than the beds below, and has been less deeply eroded. One result of its greater resistance to erosion is that its northern edge is marked by a steep, often scarp-like face (Fig. 1). The lowermost division of the marl series, the Lower Marl, is more easily eroded than the Red Sand immediately above it, both being represented in the Navesink Highlands. The red sand is the most important factor in forming the obtrusive range of high hills extending southwest from the Navesink Highlands.†

The front of the bluff is protected from the full force of the ocean waves by the projecting sand peninsula, which terminates

* Illustrated with the aid of the Catherine McManes fund.

† The difficult interpretation of the stratigraphy of the Cretaceous formations in New Jersey will be found in Annual Report of the State Geologist for 1886: 154–184; Salisbury, Rollin D.: The Physical Geography of New Jersey 1898: 115–128; Weller, Stuart: A Report on the Cretaceous Paleontology of New Jersey, Geol. Surv. of N. J., Paleontologic Series IV: 11–26; Geologic Atlas of the United States, Philadelphia Folio No. 162, also Trenton Folio No. 167.

[No. 12, Vol. 9, of Torreya, comprising pages 241–284, was issued December 31, 1909.]

in Sandy Hook; and the Navesink River joined by the Shrewsbury River enters Sandy Hook Bay by flowing past the projecting bluff. However, on consulting the map* of 1737 and the one drawn from the surveys made in 1769 (by order of the commis-

FIG. 1. Map of the Navesink Highlands, New Jersey

sioners appointed to settle the partition line between the provinces of New York and New Jersey) by Bernard Ratzer, lieutenant in the Sixtieth regiment and in 1777 of the northern parts by Gerard

* See the map of 1737 in article by G. R. Putnam entitled Hidden Perils of the Deep. National Geographic Magazine, XX, p. 825, Sept., 1909. The later map was engraved and published by Wm. Faden, Charing Cross, December 1, 1777, and a facsimile published by the N. J. Geol. Survey in 1877.

Banker, it will be found that at those dates the cliff was open to the full force of the ocean and that Sandy Hook was attached as a projecting spit of sand to the highland shore. Since that time, according to Lewis M. Haupt,* the drift from the bluffs to the southward (as at Monmouth) has gradually overlapped the foot of the Highlands and closed the mouth of the Shrewsbury and Navesink rivers,† thus serving as an effectual cover and protection for the highlands, which are no longer attacked by the ocean waves, while Plum Island (Fig. 1) represents a remnant of the ancient Sandy Hook. The undisturbed, forest-covered portion of the Navesink peninsula (the highland proper) is three and a quarter miles long and one and a half miles wide, the highest elevations (triangulation points) beginning at the west end being 239 feet, 245 feet, 260 feet, 269 feet, 235 feet, and 248 feet; while the elevations at the eastern end (see map, Fig. 1) toward the Atlantic are 240 feet and 259 feet; the hill on which the Navesink lighthouses are situated being 237 feet high. On the north and east sides, the bluffs are rather precipitous, as indicated by the closeness of the contour intervals, while on the south and more protected sides, the slope is a more gradual one. The differences in these slopes is probably accounted for by the action of the ocean and tidal currents in wearing away the material, so as to undermine the bluff and produce steep contours. From a distance, the crest of the Atlantic Highlands (Fig. 2) seems to be a fairly uniform one and a closer inspection shows that there are no streams of any importance which cut its slopes. The largest brook runs south into Clay Pit Creek flowing in a northwest direction which marks a valley which separates the highlands proper from the hills to the westward.

Vegetation

The forest, found on the summit and slopes of these highlands, belongs to what I have denominated the deciduous forest forma-

* *Haupt, Lewis M.* Changes along the New Jersey Coast. Annual Report of the State Geologist, 1905: 44–45.

† *Harshberger, John W.* The Vegetation of the Salt Marshes, Salt and Freshwater Ponds of northern Coastal N. J. Proc. Acad. Nat. Sci. Phila., 1909: 373–400, with 6 text figures.

tion. This is the type of forest which covers the valleys, hills, and lower mountain slopes of northern New Jersey. It is not a typic mesophytic forest, such as we find in the valleys and on the hills with rich, moist soil fed by numerous springs and drained by actively flowing creeks and rivers. The soil is a stiff one, and rather dry than otherwise, for the absence of springs and rapid streams indicates rather dry conditions. Besides the forest

FIG. 2. Navesink Highlands looking southeast from steamship pier at Atlantic Highlands.

is exposed to the full force of winds which blow from the north, east, and southeast and is more or less exposed to south winds which blow across the half-mile-wide Navesink River. A reference to a portion of the map represented in figure 1 will show the relative shape of the peninsula and its exposure to the cardinal points. The original forest is being rapidly encroached upon by the growth of such towns as Highlands, Water Witch Park, and Atlantic Highlands (Fig. 2), while as summer camping sites should be mentioned Shady Side, Hilton Park, and the shore along Sandy Hook Bay.

Deciduous Forest Formation

The forest consists of dominant forest trees whose crown is close enough to shade the secondary layers beneath. If one consults the forest map issued by the Geological Survey of New Jersey in 1900, it will be seen that on the Navesink Highlands there are 80 to 100 acres of forest to 100 acres of upland. The trees which form the facies are most of them mature and already show evidences of decay. The facies varies somewhat on different portions of the bluff, but in the main, it consists of *Castanea dentata* (Marsh) Borkh., *Quercus prinus* L., *Q. velutina* Lam., *Q. alba* L., *Q. coccinea* Wang, *Q. rubra* L., mentioned in the order of their relative abundance, so that it may be called the chestnut-oak facies. Mixed with these trees and reaching a size equal to the dominant trees occurs *Hicoria* (*Carya*) *glabra* (Mill) Britt., while of rare occurrence are *Fagus americana* Sweet, and *Liriodendron Tulipifera* L. The almost entire absence of these two trees seems to indicate that the climax forest of *Castanea dentata* and *Quercus prinus*, etc. has not reached the most typic mesophytic conditions where the beech and the tulip poplar are among the most important elements of the facies. Other trees, occasionally found, are *Pinus rigida* Mill, *Betula populifolia* Marsh, *B. lenta* L., *Populus tremuloides* Michx., and *Liquidambar Styraciflua* L.

The prominence of the black oak, *Quercus velutina*, in the chestnut-oak facies suggests an association described by Jennings * on Presque Isle in Lake Erie, where the black oak constitutes usually 85 to 95 per cent. of the primary layer of the forest. At Cedar Point, Sandusky, Ohio, the peninsula is an almost exact counterpart of the *Quercus velutina* habitat on Presque Isle. In the North Haven sand plains of Connecticut the black oak, although scattering, is yet the dominant tree, and at Ypsilanti, Michigan, the arid slopes of a sandy bluff are characterized as a black oak society by Brown. Cowles finds near Chicago *Quercus velutina* predominating on the south slopes of the established sand dunes and on the higher sandy ridges and beaches of glacial origin. From this and other evi-

* *Jennings, Otto E.* A Botanical Survey of Presque Isle, Erie County, Pennsylvania. Annals of the Carnegie Museum V: 325.

dence it would seem that the black oak shows a pronounced xerophytic habit under certain edaphic conditions, and with its associates previously mentioned is adapted to the rather stiff, dry, surface soil of the Navesink Highlands.

The secondary layer of the forest is composed of small trees of the dominant species together with smaller trees and shrubs which never lift their crowns to the same level as the taller trees, but are always found growing beneath them. Such are in the order of their greatest abundance *Cornus florida* L., *Acer rubrum* L., *Prunus serotina* Ehrh., *Sassafras Sassafras* (L.) Karst., *Quercus marylandica* Muench., *Q. prinoides* Willd., *Q. nana* (Marsh) Sarg. (the three latter common in the dry pine barrens of the state), *Amelanchier canadensis* (L.) Medic., and occasionally *Juniperus virginiana* L. In some places, notably in the western part of the region noted in this reconnaissance, the smaller trees are reduced to a few specimens ; in other places they become more abundant, especially in the center of the highland forest where the original conditions have been preserved. Where the growth of the dominant species is an open one, the third layer cf shrubs may be wanting, as well as the associated lianes, but such an open forest probably indicates that the original growth has been disturbed by man. The vines, or lianes, which are supported in their growth toward the light by the smaller and larger trees comprise, according to my notes made in 1908 and 1909, the following : *Parthenocissus quinquefolia* (L.) Planch., *Smilax rotundifolia* L., *Rhus radicans* L., and *Vitis labrusca* L., with *Celastrus scandens* L. in the denser woods with more humus and soil moisture.

The composition of the third layer, or that of the shrubby growth, is quite dependent upon the edaphic conditions of the soil. In the dry soil, we find the constituent elements of this layer composed of shrubs which occur in dry woods throughout northern New Jersey, such as *Kalmia latifolia* L., *Gaylussacia frondosa* (L.) T. & G., *Myrica carolinensis* Mill., *Rhus glabra* L., *R. hirta* (L.) Sudw., *Azalea nudiflora* L., and *Clethra alnifolia* L. With a damper soil and generally more humus in the valleys and on the shaded hill slopes, the same shrubs as are found in the dry woods also occur, but in addition, we find as indicative of moister

soil: *Hamamelis virginiana* L., *Viburnum dentatum* L., *V. acerifolium* L., *Leucothoë racemosa* (L.) A. Gray, and *Celastrus scandens* L. In both types, the wet and the dry, the third layer also includes specimens of the dominant and secondary forest trees which have reached the level of the shrubs in their upward growth beneath the prevailing crown of the deciduous trees. This natural reproduction of the forest by the trees which form the facies indicates that the permanent and established succession of the natural highland woods is that which we have termed the chestnut-oak succession, or climax forest. If the natural conditions are preserved by the establishment of a state forest on these picturesque hills of the Navesink Highlands, there is every reason to believe that the climax forest will perpetuate itself.

The fourth layer consists of the low shrubs which fill up the ground space beneath the taller shrubs. The low shrubs of these dry woods are *Gaylussacia frondosa* (L.) T. & G., *G. resinosa*, *Vaccinium pennsylvanicum* Lam., *Comptonia peregrina* (L.) Coult., and *Myrica carolinensis* Mill. These are propagated largely by underground parts, so that they form extensive clumps (families of Clements) to the exclusion of all other plants. In the pine barrens of New Jersey these species also occur, except *Myrica carolinensis* which becomes there edaphically suited to the moist soil of cedar swamp margins. We are hardly in a position to say that these low shrubs have entered the dry deciduous woods from a pine barren source of supply, but they occur in the pine barrens and in the dry chestnut-oak woods, because they can thrive in a dry soil. Similarity of edaphic conditions here as elsewhere encourages the same kind of vegetation.

The herbaceous or fifth layer which sometimes replaces the fourth layer, as it is in turn by a close growth of the low shrubs prevents the growth of woodland herbs, consists of such species as *Pteridium aquilinum* (L.) Kuhn, *Aralia nudicaulis* L., *Melampyrum lineare* Lam., *Sericocarpus asteroides* (L.) B. S. P., *Vagnera racemosa* (L.) Morong, *Prunella vulgaris* L. (introduced), and *Anaphalis margaritacea* (L.) Benth & Hook. In midsummer the total lack of bright color due to summer flowers is noteworthy in describing the vegetation in general at that season of the year.

As a ground layer, or sixth layer, the forest of the Navesink Highlands has a forest floor consisting of litter and leaf mould, the brownish gray monotony of which is relieved by green cushions of *Polytrichum* sp., trailing mats of *Epigaea repens* L., and isolated plants of *Cypripedium acaule* Ait.

Vegetation on the Hill Slopes

The forest on the slopes of the Navesink Highlands (Fig. 3) comes down to a narrow sand-gravel beach, or it comes in contact with small areas of salt marsh.* The immediate shore line

Fig. 3. Wooded slope, Navesink Highlands, showing deciduous forest on north slopes and the shore-line protected by loose rocks.

of the beaches is characterized by salt water plants, but on the upper beach grows an association of species including *Baccharis halimifolia* L., *Rhus copallina* L., *Sambucus canadensis* L., *Solidago sempervirens* L., *Hibiscus moscheutos* L., *Xanthium canadense* Mill, *Convolvulus sepium* L., and *Eupatorium perfoliatum* L., which tend to mingle with trees of the bluff face, such as *Celtis occidentalis* L., *Juniperus virginiana* L., *Vitis Labrusca* L., and *Rhus radicans* L.

* *Harshberger, John W. l. c.*

Barren Plant Formation

On the level summit of the Navesink Highlands at a point overlooking Sandy Hook Bay occurs a plant formation which is entirely distinct from the surrounding deciduous tree formation previously described. The whole formation is an open one and has not reached a climax condition. Here the edaphic conditions control, because the trees which enter this formation are all more or less dwarfed with their lower branches close to the ground and separated from each other by wide intervals, so that the sunlight can reach the ground all around the base of the trees. The chestnut, *Castanea dentata* (Marsh) Borkh.; the red oak, *Quercus rubra* L.; the scarlet oak, *Q. coccinea* Wang; the aspen poplar, *Populus tremuloides* Michx.; the red maple, *Acer rubrum*; the pignut hickory, *Hicoria glabra* (Mill) Britt.; the cherry birch, *Betula lenta* L.; the wild cherry, *Prunus serotina* Ehrh.; the tulip poplar, *Liriodendron Tulipifera* L.; the red cedar, *Juniperus virginiana* L.; the chesnut oak, *Quercus prinus* L., and the pitch pine, *Pinus rigida* Mill, are components of this unusual formation. Each species is represented in general by a single specimen which is more or less dwarfed in habit, assuming a rounded form. Associated with these trees and growing in the dry soil, which is bare at intervals, are found such shrubs as *Myrica carolinensis* Mill, *Rhus glabra* L., *Comptonia peregrina* (L.) Coult., and the following herbaceous plants noted in their summer (August) aspect: *Hudsonia tomentosa* Nutt., *Panicum virgatum* L., *Chrysopsis falcata* (Pursh) Ell., *Eupatorium album* L., and *Sericocarpus asteroides* (L.) B. S. P. Such lianes as *Parthenocissus quinquefolia* (L.) Planch. and *Rhus radicans* L. occur in a straggling growth by taking avail of the dwarf trees previously described. The presence of this formation is probably to be explained by the existence of some undenuded remnant of an impervious overlying stratum, such as the indurated green earth which stratigraphically is above the characteristic red sand.

The forest covering of the Navesink Highlands is, therefore, one of great uniformity. Practically, although minor differences are noticeable owing to a difference of exposure and edaphic conditions, the chestnut-oak facies represents the climax succession.

Consequently in describing the facies there is put upon permanent record the conditions as they existed during the summers of 1908 and 1909 before the despoilation of this valuable tract of woodland made a phytogeographic survey impossible.

University of Pennsylvania

FLORAL PERFUMES*

By Margaret Tucker

"Floral Perfumes: The Land and the Laboratory" is the title of the chapter in R. K. Duncan's recent book "The Chemistry of Commerce" which deals with the commerce in perfumery.

In the production of perfumes, Professor Duncan tells us, three distinct industries are involved: First, the extraction from the plant of its odoriferous principles in pure and concentrated form; second, the artificial synthesis of these principles or their successful simulation; third, the utilization of these products in the art of manufacturing perfumes.

The center of the first industry, the extraction of the natural essences of the flowers, is at Grasse, a quaint little town in the south of France, where from May till November the people are busy gathering the flowers in their season: violets, jonquils, roses, orange-flowers, thyme, rosemary, myrtle, tuberoses, jasmine, aspic, lavender from the higher Alps, and red geranium. These approximate a total weight of from ten to twelve billion pounds annually, which means a quite inconceivable number of flowers — five billion jasmine flowers alone — all picked by hand.

There are four methods for the extraction of the perfume from these flowers: (1) Distillation by steam, which results in extracted oil, and a water distillate saturated with the valuable essence which in the case of many flowers is sold as "distilled waters" known as rose-water, jasmine-water, etc. (2) Cold *enfleurage*, used for the more delicate flowers: jasmine, tuberose, and jonquil. This is a process in which every day new flowers are laid on sheets of cold pure lard, until it becomes a saturated "pomade" of essence. The solution of perfume is then extracted by

* This review was written for the teachers' department, but it is so readable that, with this explanation, it has been placed in the main part of the magazine.

cold alcohol, the alcohol is evaporated, and the product is the "quintessence" of the flowers. (3) Hot maceration, a method employing hot melted lard in which the flowers are continually paddled about until exhausted. The lard is then freed from the flowers by filtration and pressure. This process gives "quintessence" of roses, orange-flowers, and violets. (4) The fourth and most modern method — applicable to all flowers alike — is that employing light petroleum spirit to dissolve the essences, which, after the evaporation of the spirit in a vacuum, are left in solid form.

With any one flower the quantity and quality of the essence varies greatly according to the method used — a pound of violet essence, for instance, being worth $163 when extracted by distillation through steam, while a pound extracted through lard is worth $1,363. With most flowers extraction through lard gives the most perfume. It is an interesting fact that flowers continue to produce perfume after death — probably through the catalytic action of certain enzymes within the flower which results in setting free perfumes previously held in inodorous compounds. In all such technical questions as this this the Grassois are interested. Not resting content with leading the world in the purity and volume of their products, nor with the $6,000,000 that yearly rewards their toil, they are continually looking deeper into the science of each detail of their process. This is due largely to natural progressiveness and love of their work, but more and more of late due, too, to a desire to arm themselves to meet the onset of commercial chemistry and the second industry concerned with odorous materials. There is a struggle between the land and the laboratory. Let us consider briefly what the laboratory has accomplished.

In competing with the land, the laboratory has recourse to three expedients: (1) The synthetic production of the actual natural substance; (2) the successful *imitation* of the product of the land; (3) the production of entirely *new* substances with *new properties*.

By the first process, the pure essence is reproduced simply by making the ingredients of the natural oil and mixing them in the

proper proportions as determined by analysis. In this way have been manufactured natural oil of bitter almonds and of wintergreen; coumarin — the basis of the perfume called "new-mown hay", originally procured from the leaves of the "deer-tongue", an herb of Virginia, Florida, and Carolina — and vanillin — the chief odorous principle of the vanilla-pod, the fruit of a Mexican orchid. Any one of the ingredients of an essential oil may perhaps occur in a dozen different places in nature. The commercial chemist's problem is to procure each from the least expensive source. Thus vanillin which was first made artificially from coniferin, which occurs in the cambium layer of many woods, and sold at $55 a pound, is now obtained chiefly by the oxidation of eugenol, the chief ingredient of oil of cloves, and brings but one seventh of its original price.

By laboratory *imitation* of the product of the land is meant the synthetical production of a substance wholly different in chemical composition but possessed of *similar specific properties*. There are for example artificial musk, which has no known chemical relation to the secretion of the musk-deer; oil of mirbane, a substitute for oil of bitter almonds, in the scenting of soap; amyl-valerate, as essence of apple, etc.

Beside the production of the natural product or an imitation of its properties the laboratory has succeeded in creating synthetically substances with *properties often entirely new* and very valuable. Such a product is heliotropin which gives a new note in the scale of odors. It was first made from piperine extracted from pepper, but is now prepared commercially by the oxidation of saffrol from the essential oil of sassafras and from oil of camphor. Similar new synthetic products are used in making substitutes for the natural oils of violets, carnations, hyacinths, acacia, orange-flowers, roses, jasmine, and others.

But considerable as has been the progress of synthetic chemistry, it is significant to note that in no single case has the coming of a synthetic product injured the market of the natural perfume. The reason for this appears to be threefold. First, the Grassois have met science with scientific methods; second, the very finest perfumes are still the natural products and they are as much in

demand as ever among those who can afford them; third, the chemical products, being produced at a far lower cost, have enabled the perfumer, the confectioner, the soap-maker, to reach an entirely new clientele — the poor. There is one further point of interest — the laboratory's ultimate dependence on the land in the matter of perfumes — for in the majority of cases it is from plant substances, not coal tar, that the synthetic products are made.

Lastly comes the art of perfumery proper, for which these various products, natural and synthetic, furnish the raw materials — an art in which the Frenchman excels. The perfumer is a musician who from many notes (rose, violet, orange-blossom, etc.) strikes a harmonious chord of scent — for a scent is obtained only by the most artful combination of odors, each of which must be absolutely pure, the slightest impurity striking a jarring note to the trained nostril. The composition of the perfume of violet, for instance, is as follows: essence of violet, natural vanilla, tincture of orris-root, a touch of vetiver, essence of violet leaves, and artificial ionine.

One striking fact remains — that the enterprising American people, with their almost unbounded natural advantages and their protective tariff, have never entered into rivalry with the people of Grasse. To-day the total production of essential oils in the United States (150,000 pounds of peppermint oil, and small quantities of oil of wormwood, wintergreen, witchhazel, and spruce oil) does not exceed $500,000, about one twelfth of that produced by the one little town in France.

A PECULIAR HABITAT FOR CAMPTOSORUS *

By Ralph Curtiss Benedict

The following note and photograph shown in the figure were recently sent to Dr. Britton, and he has turned them over to me to record.

". . . Arthur Leeds of Phila. and I found two gum trees in the Blackwater River, Virginia, near Waverley, adorned with large colonies of Camptosorus. These trees were standing closer than ten feet; and the closest search subsequently failed to

* Illustrated with the aid of the Catherine McManes fund.

The walking fern as epiphyte.

reveal other colonies on the whole six day canoe trip. Thinking this location and the fact just mentioned somewhat unusual, we thought thee would be interested to have a specimen, and the excellent photograph contributed by my friend E. S. Cary. . . ."

Alfred S. Haines, Westtown, Pa.

The habitat is indeed interesting, showing as it does the walking fern in the unusual role of an epiphyte. One ordinarily associates this species with rocky situations, and it probably reaches its best development in such regions; but even there it is not a rock lover in the same sense as *Asplenium Trichomanes* or the genera *Pellaea* and *Woodsia*. Scattered plants often do grow along the ledges but the best growths are down below where some old moss-covered log or rock furnishes root-protection and opportunity for the leaf tips to develop new plants. The gum tree in the picture with its covering of moss or liverwort seems to have furnished the required conditions, but the origin of the colony — how it got there and whence it came — is not so easy to explain.

New York Botanical Garden

REVIEWS

Clute's Laboratory Botany*

In this manual the author has arranged a course to cover a year's work in botany for the high school. Part I deals with the structure and life processes of angiosperms; part II, with the structure and evolution of the plant kingdom. A list of physiological experiments is appended at the end of the book.

While the order in which the studies are arranged conforms to the plan adopted in the usual botanical text-books, the manual allows considerable flexibility in the treatment of topics as regards time of year, subject matter, and local conditions. For example, instead of beginning with the usual topics, cells or seeds, the study of trees may be taken up and provision is made by incorporating in the manual a handy key to the common broad-leaved and evergreen trees; parts I and II may be transposed; the physiological experiments may be performed apart from the work on morphology or they may be considered in connection with it.

*Clute, Willard N. Laboratory Botany. Pp. 172. 1909. Ginn and Co.

There is much to commend the manual to teachers. The various chapters are prefaced with useful hints on presentation, preparation, and source of materials. The choice of subjects is excellent. The questions are clear, definite, and logical, and they are designed, apparently, to give the pupil training in self-help. It is evident that the author has succeeded in preparing a valuable manual because, in large measure, he has succeeded in omitting non-essentials.

EMMELINE MOORE

NORMAL SCHOOL AT TRENTON, NEW JERSEY

Jepson's "A Flora of California" *

The beginnings of an ambitious and important work under the above title have recently appeared from the hand of Dr. Willis Linn Jepson, assistant professor of dendrology in the University of California. The sixty-four pages now published are neither the beginning nor the end of the completed volume or volumes, but are the pages that are concerned with the families that contain most of the Californian trees, the group to which, of late, Professor Jepson has devoted especial attention. It may be assumed that the preceding and intervening pages are in an advanced stage of preparation, otherwise the continuity of pagination might easily meet with serious difficulties. As to the scope of the work, one can at the date of writing simply draw inferences, but the limitation of what is yet to appear in front of the Gymnosperms to thirty-two pages suggests the probability of the inclusion of extended keys to the families and the improbability that a detailed treatment of the Pteridophyta will be attempted. The families of the Gymnosperms that find a place in the pages already published are the Pinaceae, with the genera *Pinus* (17 sp.), *Tsuga* (2 sp.), *Picea* (2 sp.), *Pseudotsuga* (2 sp.), and *Abies* (5 sp.); Taxodiaceae, with the genus *Sequoia* (2 sp.); Cupressaceae, with the genera *Libocedrus* (1 sp.), *Thuja* (1 sp.), *Chamaecyparis* (1 sp.), *Cupressus* (5 sp.), and *Juniperus* (4 sp.); and Taxaceae, with the genera *Taxus* (1 sp.) and *Torreya* (1 sp.). The

* Jepson, Willis Linn. A Flora of California. Pp. 33–64. *f. 1–13*; 337–368. *f. 61–65*. 4 N 1909. Cunningham, Curtiss & Welsh, San Francisco. Price 90 cts. for pp. 33–64; 80 cts. for pp. 337–368.

Gymnosperms, as is well known, have a remarkable development in California both as to number of species and as to the dimensions of individual trees. The botanical traveler on the Pacific Coast is soon impressed by the fact that the Sequoias are not the only "big trees." Professor Jepson gives the maximum height of the redwood (*Sequoia sempervirens*) as 340 feet; the "big tree" (*Sequoia gigantea*), 325 feet; the lowland fir (*Abies grandis*), 275 feet; the sugar pine (*Pinus Lambertiana*), 250 feet; the yellow pine (*Pinus ponderosa*), 225 feet; the noble fir (*Abies nobilis*), 250 feet; the red fir (*Abies magnifica*) and the white fir (*A. concolor*), 200 feet; the Douglas spruce (*Pseudotsuga taxifolia*), 200 feet; the tideland spruce (*Picea sitchensis*), 190 feet; the arbor-vitae (*Thuja plicata*), 190 feet; the coast hemlock (*Tsuga heterophylla*), 180 feet; the Lawson cypress (*Chamaecyparis Lawsoniana*), 175 feet; and the incense cedar (*Libocedrus decurrens*), 150 feet.

The families treated on pages 337–368 of the second part of Professor Jepson's work are the Salicaceae, with the genera *Salix* (17 sp.) and *Populus* (3 sp.); Betulaceae, with the genera *Alnus* (4 sp.) and *Betula* (2 sp.); Corylaceae, with the single genus *Corylus* (1 sp.); Fagaceae, with the genera *Quercus* (14 sp.), *Pasania* (1 sp.), and *Castanopsis* (2 sp.); Juglandaceae, with the single genus *Juglans* (1 sp.); Myricaceae with the single genus *Myrica* (2 sp.); and Urticaceae, with the genera *Urtica* (3 sp.), *Hesperocnide* (1 sp.) and *Parietaria* (unfinished).

The work includes good half-tones illustrating the general form and habit of selected species of trees and there are also drawings showing some of their less conspicuous diagnostic characters. Keys to genera and species accompany the descriptions. The nomenclature seems to be that of the Vienna Rules. The press-work is excellent, but one notes several small errors in writing or editing. Née appears uniformly and persistently with the accent over the wrong "e"; Endlicher is endowed with a prenomen that is the Latin ablative form of his name as it appears on the title-page of his Synopsis Coniferarum; *Thuja* is spelled with a "j" in the key and the bibliographical references but with a "y" in its main position; *Podocarpus* is made to end in "um";

but these and their kind are minor flaws that cannot interfere seriously with the large and helpful part that Professor Jepson's new Flora is bound to play in the study of Californian plants.

MARSHALL A. HOWE

PROCEEDINGS OF THE CLUB

NOVEMBER 24, 1909

The meeting was held at the New York Botanical Garden and was called to order by Dr. E. B. Southwick. Owing to the inclemency of the weather, there were only a few members present.

Dr. W. A. Murrill exhibited and described a phalloid found by him near Cinchona, Jamaica, in January, 1909, which is allied to the anomalous genus, *Phallogaster*, described by A. P. Morgan in 1892. A description of this new phalloid was published in *Mycologia* for January. Dr. Murrill prefaced his remarks with a brief account of the most common phalloids in the vicinity of New York and the species known to occur in the island of Jamaica.

Dr. J. K. Small spoke on "Some Recently Naturalized Plants from Southern Florida." This paper will appear in a forthcoming issue of the Bulletin.

Adjourned.

PERCY WILSON,
Secretary

DECEMBER 14, 1909

The meeting was called to order at the American Museum of Natural History, with President Rusby in the chair. Forty-four persons were present. After the reading and approval of the minutes of the meeting for November 24, the resignation of Dr. J. A. Allen, dated November 17, 1909, was presented and accepted.

The announced paper of the evening on "The Reclamation of the Desert in the San Bernardino Valley" was then presented by Dr. Rusby and illustrated by some seventy lantern-slides. The following abstract was prepared by the speaker.

The distinctions between desert and arid regions were explained and that under discussion was defined as being arid rather than desert, for the most part, although the production of cultivated crops without irrigation was impossible. The first settlement established was a Moravian mission near the present western boundary of Redlands. This was afterwards purchased by the Mormons, who instituted local irrigation. The first extensive irrigation operations were employed by the town of San Bernardino, the present water supply of which is about 1,200,000 gallons, obtained by the deflection of Lytle Creek, besides a large amount from deeply driven wells. This water supplies not only the requirements of the city, but those of a large cultivated area.

San Bernardino is near the western mouth of the large, somewhat horseshoe-shaped valley, from the mountains about which all the water of the valley must come, except that which falls during the rainy season, and which varies from six to twelve inches in the different parts of the valley, the larger amounts falling successively nearer the mountains. The moisture brought by the Pacific winds is precipitated in crossing these mountains during the winter season only. At the greater elevations, 10,000 to 12,000 feet, it is deposited as snow; lower, in the form of copious rains, and in the valley itself in a more or less scanty rainfall. During this period, moisture is not carried to the great interior plain of Nevada, Utah, Colorado, New Mexico, and Arizona, where a dry season then prevails. In the summer, conditions are exactly reversed, no rain whatever falling west of the mountains. It thus happens that the San Bernardino valley gets its natural water supply at a time when cultivation can derive the least benefit from it and the problem is presented of preserving the winter supply and distributing it during the summer. The highly successful operations in the western part of the valley demonstrated the existence of a most fertile soil of great depth, and showed that the sole requirement for a rich agricultural region was an abundant water supply. It was recognized that a town located at the eastern end or top of the valley would be nearer the mountain supply and that its subterranean streams would be

nearer the surface. The town of Redlands was therefore plotted, about twenty-two years ago, in an absolutely arid region. These calculations turned out to be perfect and the town of Redlands is now one of the most beautiful in the world, and surrounded by one of the most fertile of regions. Series of pictures illustrated the arid conditions which antedated irrigation, and were contrasted with others showing the rich orchards, vineyards, and other cultivated tracts of the present day. Land which was absolutely worthless now yields rich dividends on a valuation of from one thousand to two thousand dollars per acre. Other pictures illustrated the snow-capped summits of winter, the humid, forest-clad slopes and the gradually changing flora of the descent to the plain. The Coniferae of these mountains are of exceptional interest, because of their rarity or limited distribution. The very peculiar branch-system of *Pinus Sabiniana*, unlike that of any other pine, was well illustrated by several slides. It was remarked that two fine characteristic specimens of this species exist in the Pinetum of the New York Botanical Garden. Other Coniferae illustrated, besides many other forest species, were *Pinus Coulteri*, *Heyderia decurrens*, *Abies concolor*, and *Pseudotsuga macrocarpa*.

The peculiar problems affecting the conduct of the water to the plains and its distribution to the consumer, arising from the tendency to loss through seepage and phenomenal evaporation, the legal questions arising in regard to water rights, the necessity of governmental regulation of water supplies, the methods of estimating the requirements of various crops, under different conditions, and the methods of measurement and sale of the water were discussed.

A large number of illustrations were presented showing the methods of applying water to the orchards and vineyards. Others illustrated typical fruit trees, in flower and fruit, fruit gathering, drying, and packing. Many slides of very great beauty represented the street planting of trees and other methods employed to beautify the cities and their suburbs.

Adjourned.

Percy Wilson,
Secretary

OF INTEREST TO TEACHERS

Forestry in the High School

Mr. E. A. Sanders of Dayton, Ohio, gave last May, in the *Nature Study Review*, an outline of the forestry work done in the Steele High School under his direction. The aim was to make the work practical, and to acquaint the boys with a new and uncrowded profession. To quote from the author the results "fully justified the experiment and demonstrated the value of the work.

"The class included boys from both city and country, the studious type and the careless athletic-loving type, all of whom with one exception were deeply interested and thoro-going in their work. Two of the boys are definitely looking forward to forestry as a profession and all have shown an awakened interest in the conservation of our forests and waterways.

"The work usually consisted of two lectures, two field trips and one written or oral test per week. Laboratory work on wood structure and physical properties was introduced after Christmas and symposium reports on assigned topics occupied some attention. Lecture, laboratory and test periods were of 45 minutes each and field trips after school of two to three hours. The greatest defects were, lack of complete organization of the course and inability of all students to be present at all field trips."

The syllabus which is reprinted below seems very comprehensive for high school work. Many normal and college students do not learn to know seventy trees. The number of government circulars and bulletins used as references is suggestive. The Forest Service has for sale a large number of photographs illustrating various phases of forestry.

Syllabus of Forestry Course

A. Identification of trees (70 species)..4 weeks

Field and lecture work. Leaf keys and collections.

References. — Kellerman, Apgar, Hough.

B. Identification of woody vines and shrubs..1 week

A study of undergrowth and forest cover.

References. — Schaffner, Keeler.

C. Forest Ecology..4 weeks

A study of collections of trees. Effect of environment on forest types. Type maps, Plant societies.

References. — Graves, Schimfer, Schenk.

D. History of Forestry...1 week

Lectures on European and American forestry.

References. — Graves, Cir. 140, Forest Service U. S. A.

E. Silviculture...3 weeks

Establishment and care of forests. Tree planting and regeneration; enemies of forests. Working plans.

References. — Schenk.

F. Mensuration...3 weeks

Calculation of stands and values. Pacing, mapping, surveying, estimating. Field work. Maps.

References. — Bulletins 20 and 36. Forest Service, U. S. A.

G. Lumbering...2 weeks

History and present supplies. Conservation, forestry methods. Visits to mills. Identification of woods. Bulletin 34.

H. Laboratory Work...2 weeks

Microscopic structure and physical properties. Bulletin 10.

(Each student presents a thoro investigation of one tree as a thesis.)

Many teachers of botany will be interested in the new rules of the Carnegie Foundation for the Advancement of Teaching which make instructors (as well as professors) in accepted institutions eligible for the generous pensions provided by that fund.

In *Conservation* for December are several articles of interest to botanists. The two longest ones, which are fully illustrated, deal with forestry in Japan and the relation of the South to conservation in the conservation projects in the Appalachian Mountains.

The last Forest Service report states that the states leading in the production of last year's lumber supply of over $500,000,000 are (in the order named): Washington, Louisiana, Mississippi, Arkansas, Wisconsin, Texas, Michigan, Oregon, Minnesota, and Pennsylvania. The rank of Louisiana and Texas may be somewhat surprising. Yellow pine from the southern states leads the list, over 33 per cent. of all lumber cut; Douglas fir of the northwestern states was second; and white pine, third.

Articles of interest in the November issue of the *Popular Science Monthly* are the World of Life as Visualized and Interpreted by Darwinism, an abstract of a lecture delivered by Alfred Russel

Wallace; Desert Scenes in Zacatecas, an illustrated paper by Professor J. E. Kirkwood describing the 400,000 square miles of country south of the Rio Grande; and a continued paper on The Argument for Organic Evolution before "The Origin of Species," by Professor Arthur O. Lovejoy.

Mention has not been previously made of the description of a simple chemical device illustrating Mendelian inheritance, which was printed in the *Plant World* for July, 1909. A litmus solution, sodium hydroxide or aqua ammonia, and hydrochloric acid are used to illustrate: "the more common type of Mendelian inheritance, that in which presence is dominant over absence"; "the dominance of absence over presence"; and "the equivalence of reciprocal crosses, regardless of the fact that egg and sperm differ much in size."

The September *Popular Science Monthly* includes a short article by Luther Burbank on Another Mode of Species Formation. In this article Mr. Burbank calls attention to the fact that those who formerly practised crossing to secure a mongrel which might or might not surpass its parents did not realize that "*crossing was only the first step* and *that selection from the numerous variations secured in the second and a few succeeding generations was the real work* of the new plant creation" work. Mr. Burbank gives an interesting list of hybrids, some formed under cultivation, and some found in a wild state, which come true to seed.

A gigantic irrigation scheme is being planned for the rehabilitation of Mesopotamia upon such a scale that 3,000,000 acres of the best land in that country will be provided with water. The plans consist of providing a means of escape for the flood waters of the Euphrates; and the Tigris, the Euphrates, and the Akkar Kuf Lake will form part of a controlled system of canals whereby the pernicious silt is to be separated, floods are to be prevented, and wheat-bearing land is to be supplied with water. It is estimated that the cultivated area will be doubled, the crop of wheat

along the Euphrates being trebbled. The scheme would also mean a vast increase in the yield of cotton.

The *Outlook* for December 4 contains an article by Gifford Pinchot entitled "The A, B, C of Conservation" in which he answers six questions asked by the *Outlook:* What does Conservation stand for? What has Conservation to do with the welfare of the average man to-day? What is the danger to the Conservation policies in the coming session of Congress? Why is it important to protect the water powers? How must it be done? Does the same principle apply to navigable streams as to non-navigable?

The first answer includes such telling phrases as "to make this country the best place to live in, both for us and our descendants"; "equal opportunity for every American citizen to get his fair share of benefit from these resources, both now and hereafter"; "the same kind of practical common-sense management" that "every business man stands for in the management of his own business." To the second, Mr. Pinchot answers, "Conservation holds that it is about as important to see that the people in general get the benefit of our natural resources as to see that there shall be natural resources left." The danger suggested in the third is that "Congress must decide at this session whether the great coal-fields still in public ownership shall remain so, in order that their use may be controlled with due regard to the interest of the consumer, or whether they shall pass into private ownership and be controlled in the monopolistic interest of a few.

Congress must decide also whether immensely valuable rights to the use of water power shall be given away to special interests in perpetuity and without compensation, instead of being held and controlled by the public."

In the answer to the fourth, we find "the greatest source of power we know is falling water.. Furthermore, it is the only great unfailing source of power. Our coal, the experts say, is likely to be exhausted during the next century, our natural gas and oil in this. Our rivers, if the forests on the watersheds are properly handled, will never cease to deliver power."

Two measures are advocated in answer to the fifth question. "First, the granting of water powers forever, either on non-navigable or navigable streams, must absolutely stop. It is perfectly clear that one hundred, fifty, or even twenty-five years ago our present industrial conditions and industrial needs were completely beyond the imagination of the wisest of our proceedings. It is just as true that we cannot imagine or foresee the industrial conditions and needs of the future." Water powers "must and should be developed mainly by private capital, and they must be developed under conditions which make investment in them profitable and safe. But neither profit nor safety require perpetual rights."

Second, "the men to whom the people grant the right to use water power should pay for what they get."

To the sixth Mr. Pinchot answers by showing that the power to be gained from navigable streams differs only in that it is secured from a larger volume of water dropping a shorter distance, and that since "every stream is a unit from its source to its mouth it is just as essential that the people should "retain and exercise control of water power monopoly on navigable as on non-navigable streams."

These answers show that Mr. Pinchot advocates a policy "thoroughly democratic in its essence and tendencies," and emphasizes his feeling that the people have the right and the duty, the duty no less than the right, to protect themselves against the uncontrolled monopoly of the sources which yield the necessaries of life.

NEWS ITEMS

At the University of Maine, Professor H. G. Bell, of the Iowa State College, has been elected professor of agronomy.

Following the resignation of Professor Henry S. Graves, Professor J. W. Toumey has been appointed acting director of the Yale Forestry School.

Mr. Darius Ogden Mills, of New York City, died recently in California; among his public bequests is a gift of fifty thousand dollars to the New York Botanical Garden.

Wellesley has bought as a memorial the entire collection of lichens which was made by the late Professor Clara E. Cummings, Hunnewell professor of cryptogamic botany at Wellesley.

Mr. F. A. Woods, chief of the Bureau of Plant Industry of the United States Department of Agriculture, has been appointed dean of the agricultural department of the University of Minnesota.

The establishment of an agricultural college at Mayaguez, Porto Rico, has been authorized by the territorial legislature and I. W. Hart, of the School of Agriculture, São Paulo, Brazil, has been elected president.

Dr. Marshall A. Howe and Mr. Norman Taylor, of the New York Botanical Garden, have just returned from trips in the tropics. Dr. and Mrs. Howe were collecting in the Panama region and Mr. and Mrs. Taylor in eastern Santo Domingo.

Yale University has just received from Mrs. Russell Sage $650,000 to complete the purchase of Sachem's Woods, a large tract of land which will furnish a new campus and give building sites for new buildings, among them a biological laboratory.

The subjects for the Walker prizes of 1911 have been announced. Those of interest to botanists are: A study of the structure, development, and biology of some peat bog; a comparative investigation of the Gnetales; the relation of Mendelism to natural selection; and a monograph of some genus or group of fungi.

Secretary Wilson, at a recent conference of the bureau chiefs of the Department of Agriculture, appointed a committee to report upon the amount of outside work which may be conducted by government employes; the Secretary feels that the hundreds now so employed should produce results for the government before devoting part of their talents to outside interests.

Mr. Gifford Pinchot, chief forester of the United States, has resigned his position, and Professor Henry S. Graves of the Yale Forestry School has been appointed in his place. As forester, Mr. Pinchot has rendered invaluable services to his country, and it is unfortunate that administrative difficulties have made such a change necessary. Fortunately, the present indications

are that Mr. Pinchot's interest and influence will be still felt in the forest preservation legislation under discussion.

Applications for a scholarship at the Zoölogical Station at Naples, which affords opportunity for research in zoölogy, botany, and physiology (with all the materials, apparatus, and assistance, free of cost) should be sent to the secretary (Mrs. A. D. Mead, 283 Wayland Ave., Providence, R. I.), on or before March 1, 1910. Attention is also called to the $1,000 prize, which has been offered periodically by the Association for the best thesis written by a woman, on a scientific subject, embodying new observations and new conclusions based on an independent laboratory research in biological, chemical, or physical science, and which will be awarded in April, 1911. Circulars giving the conditions of the award of the prize will be furnished by the secretary.

The Boston meeting of the American Association for the Advancement of Science was attended by more than thirteen hundred members and more than a thousand papers were presented. The botanical papers offered by the botanical section of the Association, Section G, and by the Botanical Society of America, the Society of American Bacteriologists, the American Phytopathological Society, the Sullivant Moss Society, and the American Society of Naturalists number over one hundred and sixty. These included Professor Ganong's address (as retiring president of the Botanical Society of America) on the teaching of botany and Professor Richard's address (as retiring vice-president of Section G) on the nature of response to chemical stimulation. There was a symposium on botanical gardens, one on nuclear phenomena of sexual reproduction in thallophytes and spermatophytes, and another on plant responses. Other papers of interest to botanists and to teachers of botany were given by the following scientific bodies: the Association of Horticultural Inspectors, the American Nature Study Society, the American Association of Economic Entomologists, the Association of American Geographers, and by several divisions of the American Chemical Society: the Division of Agricultural and Food Chemistry, the Division of Fertilizer Chemistry, the Biological Chem-

istry Section, the India Rubber Chemistry Section, and the American Society of Biological Chemists.

In a recent message Governor Hughes announced a gift of Mrs. E. H. Harriman which adds to the park along the Hudson some ten thousand acres of land. The Palisade Interstate Park, established by the joint action of New York and New Jersey, extends from Fort Lee north on the western side of the Hudson nearly to Haverstraw. A smaller strip farther north, from Stony Point to Cornwall, is known as the Hudson Forest Reserve. The Harriman gift is a very wide, irregular piece of land between the two. Besides the land a million dollars was given for the purchase of adjacent property. Other wealthy people have given conditionally over $1,500,000 for the extension of this park: John D. Rockefeller and J. Pierpont Morgan, a half million dollars each; Mrs. Russell Sage, William K. Vanderbilt, George F. Baker, James Stillman, John D. Archbold, William Rockefeller, Frank A. Munsey, Henry Phipps, E. T. Stotesbury, E. H. Gary, and George W. Perkins, fifty thousand dollars each; Helen Miller Gould, twenty-five thousand dollars; Ellen F. James and Arthur Curtiss James, jointly, twenty-five thousand dollars; and V. Everit Macy, twenty-five thousand dollars. The conditions under which these subscriptions were made stipulate that this park be put under the jurisdiction of the already existing Palisade Park Commission; that the State of New York appropriate two and a half million dollars toward the support of the park; and that a proportionate contribution be made by New Jersey. One side of the Hudson will therefore be fully guarded. The Palisade Park Commission has already given evidence of its efficiency and public spirit, having established the existing park without compensation and at the small cost (for personal expenses) of less than five hundred dollars, and this guardianship is a fitting tribute to its services.

TORREYA

February, 1910

Vol. 10 No. 2

THE VEGETATION ON LOOKINGGLASS MOUNTAIN *

By Homer Doliver House

1. Location and Geology

Lookingglass Mountain or rock is located in the northern part of Transylvania County, North Carolina, on the estate of George W. Vanderbilt; the extreme northern corner of the county being occupied by that curious valley, the "Pink Beds." Lookingglass Mountain is about three miles southeast of Pisgah Ridge which forms the northwestern boundary of the county with altitudes of 4,500 feet (Pigeon Gap) to 6,040 feet (Chestnut Bald), and situated between two streams, Rockhouse Creek and Lookingglass Creek, both emptying into Davidson River below the mountain, at an altitude of about 2,300 feet. The summit of Lookingglass is 4,000 feet altitude and three sides of the mountain are granite cliffs, in places several hundred feet high, the top being a table-like summit sloping southwestward toward Davidson River, on which side the cliffs are few or in places none. The greatest abruptness of slope is on the northern and eastern sides. Viewed from the northeast (Fig. 1) the mountain appears like a gigantic dome rising in the middle of a valley, all the mountains surrounding it possessing equal or greater altitudes except the narrow valley of Davidson River.

The geological structure is Whiteside granite, the peculiar shape said to be due to spheroidal weathering of the granite which is supposed to be of an intrusive origin and younger than the surrounding formations, perhaps as late as the Carboniferous Age.

The soil on the summit is nowhere deep and in many places

* Illustrated with the aid of the Catherine McManes fund.

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entirely absent. Chiefly it is a yellowish clay strewn with fine sand and, where vegetation is persistent, the admixture of humus produces a fairly fertile soil which is however, from the nature of its composition, origin, and position, subjected to extremes of moisture and dryness. Numerous tiny springs rise here and there and, escaping down the smooth surfaces of the granite, furnish periodical moisture for extensive lithophytic societies, chiefly lichens. Most of the springs cease with periods of drought.

FIGURE 1. Lookingglass Mountain from the northeast.

2. VEGETATION

The northern and western exposures of granite are in particular, covered with a more or less dense growth of lichens. In crevices and more secure places, mosses and *Selaginella* occur ; the latter, however, is much more abundant on the exposed rocks of Roan and Carolina gneiss, which make up the adjacent Pisgah Ridge.

The arborescent flora possesses many features of peculiar interest. Deformities due to exposure to severe winds are abundant.

The coniferous species are most conspicuous from a distance but do not comprise the largest number of individuals. There are four species. *Tsuga caroliniana* is abundant all over the northern and western brow of the mountain (Fig. 2). *Pinus pungens* is as conspicuous and more generally distributed down the backbone of the mountain (Fig. 3), as well as occurring as twisted and deformed individuals in crevices and on ledges on the upper slopes of the cliffs. *Juniperus virginiana* is scattered along exposed places and is always dwarfed or grotesque in shape.

FIGURE 2. Hemlocks on the northern and western brow.

Pinus rigida is found chiefly along and down the backbone of the mountain, the forest of which partakes more of the character of that of the adjacent dry ridges. Of these four conifers, the last only is common throughout the adjacent region, *Juniperus* being very rare and *Tsuga caroliniana* being represented by but one mature individual in the Pink Beds, and none so far as known on Pisgah Ridge. *Pinus pungens* occurs in scattered colonies along the exposed slopes of Pisgah Ridge, and rarely in the Pink Beds valley, which is underlaid by Whiteside granite, sometimes exposed.

The broadleaf arborescent species do not show the same degree of localization as shown by the coniferous species. The most important species are *Castanea dentata*, *Quercus Prinus*, *Q. coccinea*, *Q. rubra*, *Q. alba*, *Acer rubrum*, *Hicoria glabra*, and *Cornus florida*. Dwarfed or shrub-like specimens of several smaller trees are common, especially on the exposed brow of the cliff, the principal species being *Amelanchier canadensis*, *Castanea pumila*, *Chionanthus virginica*, *Symplocos tinctoria*, *Hamamelis*

FIGURE 3. Pines on Lookingglass Mountain.

virginiana, and *Sassafras variifolium*. Perhaps the most interesting broadleaf found here was *Populus grandidentata*, represented by a few young trees.

Among the shrubs, *Kalmia latifolia* and *Rhododendron maximum* predominate here as they do nearly everywhere in this region. A very rare species here is *Rhododendron punctatum* which is common along the Davidson River banks, 2,000 feet lower, and on Cold Mountain, 2,000 feet higher. On the southern exposures of the mountain, *Kalmia* blooms a week earlier than it does

on the adjacent ridges and two to three weeks earlier than in the Pink Beds, nearly 1,000 feet lower altitude. The buckberry (a local name), *Gaylussacia ursina*, *G. resinosa*, *Clethra acuminata*, *Leucothoë recurva*, *Azalea lutea*, *Pyrus melanocarpa* (*Aronia nigra* Britton), *Vaccinium corymbosum*, *Robinia hispida*, and *Rhus copallina* are common and conspicuous shrubs on the summit of the exposed cliffs. The drier woods on the back of the mountain contain numerous specimens of *Myrica asplenifolia* and *Vaccinium stamineum*. *Epigaea repens* is common on the wooded portions of the summit.

The herbaceous vegetation varies greatly in appearance with the season. In early May the most conspicuous herbaceous plants are *Viola hastata*, *V. rotundifolia*, *Adopogon montanus*, *Hypoxis hirsuta*, *Potentilla canadensis*, *Iris verna*, *Erigeron pulchellus*, *Saxifraga virginensis*, *Viola pedata*, *V. primulaefolia*, and *V. affinis*.

In midsummer most of the above named plants become inconspicuous and their place is taken by such species as *Eupatorium pubescens*, *Gerardia tenuifolia*, *Aster Curtissii*, *Bidens bipinnata*, *Stenanthium heterophyllum*, *Capnoides sempervirens*, *Talinum teretifolium*, and *Xyris* sp.

The last two named are not found elsewhere in the adjacent region, although the writer has not visited John Rock and Cedar Rock Mountains nearby which possess similar geological formations.

Woody Plants of Lookingglass Mountain in Order of Relative Abundance

(Starred species were either young, dwarfed, or shrub-like.)

Trees	Shrubs
Quercus Prinus L.	*Kalmia latifolia* L.
Castanea dentata (Marsh) Borkh.	*Rhododendron maximum* L.
	Vaccinium corymbosum L.
Quercus rubra L.	*Gaylussacia ursina* (M. A. Curtis) T. & G.
Tsuga caroliniana Engelm.	
Quercus coccinea Muench.	*Andromeda ligustrina* (L.) Muhl.
Pinus pungens Lamb.	*Vaccinium stamineum* L.
Quercus alba L.	*Rhododendron punctatum* Andr.

Acer rubrum L.
Cornus florida L.
Sassafras variifolium (Salisb.) Ktze.*
Chionanthus virginica L.*
Castanea pumila (L.) Mill.*
Hicoria glabra (Mill.) Britton
Amelanchier canadensis (L.) Medic.
Halesia carolina L.
Symplocos tinctoria (L.) L'Her.*
Robinia Pseudo-Acacia L.
Hamamelis virginica L.*
Pinus rigida Mill.
Acer pennsylvanicum L.*
Oxydendron arboreum (L.) DC.
Nyssa sylvatica L.
Liriodendron Tulipifera L.
Populus grandidentata Michx.
Betula lutea Michx. f.
Juniperus virginia L.*
Azalea lutea L.
Pyrus melanocarpa (Michx.) Willd.
Clethra acuminata Michx.
Gaylussacia resinosa T. & G.
Leucothoë recurva (Buckley) Gray.
Rhus copallina L.
Myrica asplenifolia L.
Amorpha fruticosa L.
Robinia hispida L.
Sambucus canadensis L.

It is interesting to note that eleven of the seventeen species of shrubs belong to the Ericaceae. Of the arborescent species, six belong to the Fagaceae and four to the Pinaceae. Nearly all of the other arborescent species represent different families.

BILTMORE FOREST SCHOOL

A NEW SPECIES OF DEWALQUEA† FROM THE AMERICAN CRETACEOUS ‡

By EDWARD W. BERRY.

The genus *Dewalquea* was founded by Saporta and Marion in 1874 § upon remains from the Senonian of Westphalia communicated by Debey and named by him in manuscript *Araliophyllum*, and on additional remains collected by those authors from the

† Illustrated with the aid of the Catherine McManes fund.

‡ Published by permission of the Director of the United States Geological Survey.

§ Saporta and Marion, Mém. cour. et des Sav. étrangers de l'Académie 37 : 55. 1874.

Paleocene of Gelinden, Belgium (Marnes heersiennes = Etage Thanetien). Three species were enumerated, *Dewalquea haldemiana* and *Dewalquea aquisgranensis* from the Westphalian Senonian and *Dewalquea gelindenensis* from the basal Eocene. In the last thirty-five years several additional species have been referred to this genus. These include another species from the German Senonian (*Dewalquea insignis*) described by Hosius and v. d. Marck;* two species from the Cenomanian of Bohemia (*Dewalquea coriacea* and *Dewalquea pentaphylla*) described by Velenovsky;† two American species from the Dakota group (*Dewalquea dakotensis* and *Dewalquea primordialis*) described by Lesquereux,‡ both of which are fragmentary and of uncertain relationship; a species from the Raritan of New Jersey (*Dewalquea trifoliata*) described by Newberry; § and a species described by Heer ‖ from Greenland (*Dewalquea groenlandica*) and subsequently recorded from Staten Island, New Jersey, North Carolina, and Alabama.

Hosius and v. d. Marck (loc. cit., p. 50) record the Eocene species from the Senonian of Westphalia but the remains are not of this species but fragments of *Dewalquea haldemiana* which is common at that horizon. The European species *Dewalquea insignis* is recorded by Heer ¶ from both the Atane and Patoot beds of Greenland and by Hollick** from the Cretaceous of Staten Island but both of these determinations are based upon fragments of single leaves and are, in the writer's judgment, entirely untrustworthy. Attention should also be called to the possibility of *Celastrus arctica* Heer†† representing the leaflets of a *Dewalquea*.

* Hos. and v. d. Marck, Palaeont. 26: 172. *pl. 32. f. 111–113; pl. 33. f. 109; pl. 34. f. 110; pl. 35. f. 112.* 1880.

† Velenovsky, Fl. böhm. Kreidef. 3: 11, 14. *pl. 1. f. 1–9; pl. 2. f. 2; pl. 8. f. 11, 12.* 1884.

‡ Lesq., Fl. Dakota Group, 211. *pl. 59. f. 5, 6.* 1892. Geol. and Nat. Hist. Surv. Minn. 3: 18. *pl. A. f. 10.* 1893.

§ Newb., Fl. Amboy Clays, 129. *pl. 22. f. 4–7.* 1896.

‖ Heer, Fl. Foss. Arct. 6²: 87. *pl. 29. f. 18, 19; pl. 42. f. 5, 6; pl. 44. f. 11.* 1882.

¶ Heer, op. cit., 86. *pl. 25. f. 7; pl. 33. f. 14–16.* 1882; ibid. 7: 37. *pl. 58. f. 3; pl. 62. f. 7.* 1883.

** Hollick, Mon. U. S. Geol. Surv. 50: 106. *pl. 8. f. 24.* 1907.

†† Heer, op. cit. 7: 40. *pl. 61. f. 5, d, e.*

This species was described from the Patoot beds of Greenland where it is sparsely represented. It is abundant, however, in the Upper Raritan of New Jersey, but of some scores of specimens examined by the writer all were detached and failed to show their habit of growth.

The botanical relationship of *Dewalquea* has always remained obscure and no better discussion of it is extant than that given by Saporta and Marion,* who after comparing these leaves with those of *Ampelopsis*, *Arisaema*, *Anthurium* (Araceae), etc., arrive at the conclusion that they are prototypes of the tribe Helleboreae of the Ranunculaceae.

The new species, a description of which follows, may be called :

Dewalquea Smithi sp. nov.

Leaves palmately decompound, the petiole dividing into three principal branches, the angle of divergence varying from 20° to 60° and the two lateral branches forking at an acute angle 1 to 2 cm. above their base. The middle leaflet is lanceolate in outline, being widest in its central part and tapering almost equally to the acute apex and base. Length 7.5 cm. to 16 cm. Greatest width 2 cm. to 4 cm. Margin entire or serrate, usually entire below and serrate in the apical three fourths, sometimes with large aquiline-serrate teeth. Midrib stout. Secondaries regular, subopposite, parallel ; about 20 pairs, branching from the midrib at angles varying from 45° to 70° usually about 50°, curving upward and running to the marginal teeth in some specimens as in the restoration. In other specimens and in entire margined forms they are camptodrome. The base of the leaflet extends downward to within 2 or 3 mm. of the forks of the petiole. Lateral leaflets more or less inequilateral, usually somewhat smaller than the middle leaflet. The internal leaflet is lanceolate, the outer lamina starting at or very near the point where the lateral branch of the petiole forks. The inner lamina, however, extends downward almost to the base of the lateral branch making the base markedly inequilateral. In general outline, marginal, and venation characters it is identical with the middle leaflet. The outer lateral leaflet is also somewhat inequilateral but less so than the internal lateral leaflet, its internal lamina starting at or near the fork and its outer lamina extending more or less below the fork. Marginal and venation characters as in the other leaflets.

* Loc. cit., pp. 55–61.

This handsome species is common in the Tuscaloosa Formation at Whites Bluff on the right bank of the Warrior River 309 miles above Mobile, Alabama. A small collection of fossil plants from this outcrop containing no less than 27 specimens of

FIGURE 1. Restoration of *Dewalquea Smithi* from the Tuscaloosa formation of Alabama (½ nat. size).

this form. Several of these were complete and were sketched at the time they were collected, which proved fortunate, since the extremely arenaceous matrix did not withstand shipment very well. The museum material, while considerably broken, shows several entire detached leaflets and three or four basal

parts of the leaf showing the mode of division of the petiole. As a number of figures would be necessary to show the entire leaf a restoration of it is shown in the accompanying text-figure. This restoration is based entirely upon material representing all parts of the leaf and is therefore not hypothetical in any particular.

It is named in honor of Prof. E. A. Smith, the efficient state geologist of Alabama. Leaflets of this species, nearly all of which are terminal, are also common in the Middendorf clays near Langley, South Carolina.

This species is markedly distinct from the American species of *Dewalquea* previously described, all of which were apparently tripartite. Among the European species it is quite similar to the Senonian species *Dewalquea insignia* Hos. and v. d. Marck which is, however, entirely distinct. It is also similar to *Dewalquea coriacea* and *Dewalquea pentaphvlla* described by Velenovsky from the Cenomanian of Bohemia.

As mentioned above this Alabama species shows entire and serrated forms and it is remarkable that wherever this genus has been found to occur in any abundance, two species are usually described, one entire and one with toothed margins. Thus in Germany *Dewalquea haldemiana* is entire while *Dewalquea insignis* is toothed, and probably both are the leaves of the same plant. In Bohemia *Dewalquea pentaphylla* is entire while *Dewalquea coriacea* is toothed. In the case of the Alabama plant it is believed that the entire and serrate leaves are specifically identical since the material shows a great many gradations in the size of the teeth and great variability regarding the proportions which the entire part bears to the toothed part on single leaflets.

Johns Hopkins University,
Baltimore, Maryland

SHORTER NOTES

The Weeping Willow in Winter. — A large weeping willow on the university campus shows, in winter, such a complete change from its "weeping" habit that further information seems desirable. The slender unbranched twigs (one to two feet long),

which in the fall hang vertically from the whole tree, are now curled fantastically upward over the whole tree, giving it a rather bushy appearance. They have so changed their relative position with the parent branches as to be now, with few exceptions, wholly above the point of origin instead of hanging wholly below as in summer. The writer first noticed this in January, 1909, but supposing it well known, gave it no further thought except to look for it this year. In November the branches were still pendant; the next observation, January 1, 1910, showed again the winter condition described above. Has ony one observed the phenomenon elsewhere? When does it begin? What changes take place in the spring? How can it be explained? Is there any literature on the subject? JEAN BROADHURST

A WISCONSIN RIDDLE. — The accounts which the earliest explorers of our country have left of the plants which, for one reason or another, attracted their attention are always interesting, and not infrequently puzzling. Such is the Report of Father Dablon, given in the Jesuit Relations for 1671–72. He describes his new mission of St. François Xavier, at De Pere rapids, on Fox River, Wisconsin. While telling of his missionary labors among the savages, he comments also on the animals and the plants of the vicinage. "Besides the grapes, plums and apples," he writes, "which would be fairly good if the savages had patience to let them ripen, there also grows on the prairies a kind of lime, resembling that of France, but having no bitter taste, not even in its rind. The plant bearing it slightly resembles the fern."

Again he tells how an Indian pointed out to him a medicinal plant, whose root was "employed to counteract snake-bite, God having been pleased to give this antedote against a poison which is very common in these countries. It is very pungent, and tastes like powder when crushed with the teeth. It must be masticated, and placed upon the bite inflicted by the snake." He gathered some of this plant, "for future examination," but records no tests of its efficacy.

What were the plants which the good Father thus describes? Probably botanists familiar with the region may be able to recognize them. S. B. PARISH

REVIEWS

Coulter and Nelson's New Manual of Rocky Mountain Botany*

Teaching botanists in the Rocky Mountain region, and in addition a wide circle of people who are interested in knowing the vascular flora, will welcome the "New Manual of Rocky Mountain Botany" by Professor John M. Coulter, of the University of Chicago, and Professor Aven Nelson, of the University of Wyoming. For years there has been no satisfactory manual of the region available. Since Coulter's Manual of the Rocky Mountain Region appeared in 1885, botanists have been active in the field, greatly increasing the known species and segregating large genera. Several publications, among these Professor Nelson's Key to the Rocky Mountain Flora, dealing inadequately with the spring and early summer flora have appeared at intervals. In 1906 there was published, at the Colorado Agricultural Experiment Station, at Fort Collins, the "Flora of Colorado" by Dr. P. A. Rydberg, which contains analytical keys to the orders, genera, and species but no decriptions of species. It, therefore, has been necessary in order to insure correct identification to consult original descriptions or to submit specimens to the expert.

The new manual is not in any sense a revision of Coulter's Manual. Professor Nelson has completely rewritten the book and assumes responsibility for any errors it may contain. He is well qualified for the task, having given in the neighborhood of twenty years of careful study to the flora of the Rocky Mountain region. He has had a large experience in the field; has gathered by his own efforts, and with the aid of his pupils, and by exchange, a splendid herbarium; and has familiarized himself with the original descriptions and checked these by an examination of the plants. No man to-day is more familiar with the vascular plants of the region than is Professor Nelson.

It is a satisfaction to find the book is neither ultra-radical nor strikingly conservative in taxonomy. Freedom from extremes

*Coulter, John M. Revised by Aven Nelson. Pp. 646. American Book Company, New York. 1909. $2.50.

makes it a very serviceable book. It contains very clear and concise descriptions of 649 genera, 2,733 species, and 186 varieties. Synonyms, numbering 1,788, are inserted with the species descriptions thus increasing the value of the book. The keys to genera and species appear to be accurate and clear so far as they have been tested by the writer.

In priority of names and in segregation, exception is frequently taken to Dr. Rydberg's publications. There is a return to such long used and satisfactory family names as Leguminosae, Gramineae, Cyperaceae, Umbelliferae, Cruciferae, and Compositae. *Pinus*, *Apinus*, and *Caryopitys* are included in the single genus *Pinus*. The number of species of *Quercus* has been somewhat reduced. In this genus distinctions have at times been made of which the characters ascribed to separate species may sometimes be found to occur on a single tree or shrub. This reduction should meet with general approval, as will the contraction of *Gutierrezia* into five seemingly well-defined species. Among the Gramineae *Muhlenbergia* contains seven species and one variety, and *Poa* is reduced to twenty-five species. *Astragalus* has again come to its own, the seventeen genera of Dr. Rydberg are brought together into this single genus. And yet the reduction in the number of species within genera is not the policy throughout the manual. When species and varieties are clearly defined they are given a space. Thus there are described twenty-four species of *Mertensia* and fifty-four species and varieties of *Pentstemon*. Many other examples might be enumerated.

The best test of the general value of such a manual will be its usefulness to others than the trained systematist. The authors are to be congratulated on having given us a book with workable keys, clear descriptions, and at the same time to have included practically all well-defined species.

Edward C. Schneider

Colorado College,
Colorado Springs, Colorado

PROCEEDINGS OF THE CLUB

January 11, 1910

The annual meeting was called to order at the American Museum of Natural History at 8:30 P. M., with President Rusby in the chair. Eleven members were present.

After the reading and approval of the minutes of December 14, 1909, the following names were presented for membership:

Miss Gladys Pomeroy, 55 Broad St., Newark, N. J.; Miss L. H. Seely, 50 Gautier Ave., Jersey City, N. J.; and Prof. A. O. Garrett, 615 S. 9th East St., Salt Lake City, Utah.

The resignation of Miss Sarah A. Robinson, 239 East Houston St., New York City, was read and accepted.

The annual report of the treasurer was presented and on motion was received and referred to the auditing committee.

The secretary reported that fifteen meetings had been held during the year with a total attendance of 411, as against 463 in 1908, and an average attendance of twenty-seven, as against thirty last year. Six persons have been elected to membership, and fourteen resignations have been received and accepted.

Seven illustrated lectures were delivered during the season at which the combined attendance was 260.

The chairman of the program committee reported that the programs have been provided for as usual.

As delegate to the Council of the New York Academy of Sciences, Mr. Charles Louis Pollard stated that he had attended all but one meeting during the year.

The editor of Torreya reported as follows for the year 1909: twelve numbers were issued, containing 284 pages including index to the volume, at a cost of $449.21.

By reason of the absence of the editor and the chairman of the field committee, no reports were received from them.

Mr. Fred J. Seaver, chairman of the program committee, read the following communication signed by the members of this committee:

"We, the program committee of the Torrey Botanical Club, hereby recommend that a special fund be raised by private con-

tributions, to enable us to arrange for special lectures on popular subjects in botany, to be given on the second Tuesday evening of each month at the American Museum of Natural History and that the speakers be suitably recompensed for their services." Upon motion this recommendation was approved.

It was voted that a committee be appointed by the President to read over the minutes and consider the subject of the revision of the constitution and by-laws.

Election of officers for the year 1910 resulted as follows:

President, H. H. Rusby; *vice-presidents*, Edward S. Burgess and John Hendley Barnhart; *recording secretary*, Percy Wilson; *editor*, Marshall Avery Howe; *treasurer*, William Mansfield; *associate editors:* John Hendley Barnhart, Jean Broadhurst, Philip Dowell, Alexander W. Evans, Tracy Elliot Hazen, William Alphonso Murrill, Charles Louis Pollard, and Herbert M. Richards.

Mr. Walter C. Cameron and Mr. Bernard O. Dodge were nominated for membership.

Adjourned.

PERCY WILSON,
Secretary

OF INTEREST TO TEACHERS

SUGGESTIONS FOR PLANT PHYSIOLOGY

BY G. E. STONE

Some time ago I received a letter from you with a question as to whether "physiological work in high school botany should be *more* or *less* quantitative," etc., and I am sending the following comment, although it may not be worthy of publication.

I do not feel familiar enough at the present time with the work of the high schools in botany to give an opinion as to how much time should be devoted to this subject, and whether it would be expedient to give it more time, since there is always complaint among citizens regarding the crowding of the public school curricula. If there were only a little time available for a course in physiological work in the high school it would be almost neces-

sary that the experiments be done by the teacher ; in other words, the work would be in the form of a demonstration course. Satisfactory work may be done by pupils working in groups, but better work is done individually.

The experiments selected should be those which possess the most value ; that is, those which illustrate some fundamental plant function ; and these experiments in our estimation should be simple and carefully done with inexpensive apparatus. A larger number of failures is likely to result from the use of simple appliances, but a failure often possesses just as much pedagogical value as a success.

The question as to whether one should have a costly set of appliances with which to work out a certain course in physiological botany, or should make use of simple ones, is dependent very largely upon the instructor. Simple apparatus in the hands of an incompetent instructor would have little value, and even complicated and expensive apparatus would with such an instructor be worth little more.

For many years the tendency among American instructors has been toward the belief that it is impossible to accomplish scientific work without expensive apparatus, and this is unfortunate. It is a well known fact that original investigation and discovery does not keep pace with the improvements in appliances and the more completely equipped laboratories. Some of our best investigators, like Professor Trowbridge of Harvard and Professor Oswald of Leipzig, do not hesitate to write books advocating the use of home-made apparatus. Those who make use of these simple forms of appliances may therefore consider themselves in good company.

In regard to the line of experimentation, the most fundamental would include simple experiments in respiration, photosynthesis, transpiration, heliotropism, and geotropism. Many simple and instructive as well as fundamental experiments may also be done in connection with soils and plant foods, using commercial fertilizers, if necessary.

Massachusetts Agricultural College

Practical Plant Physiology

An address by Mr. F. H. Bolster of the Gardena (California) high school is quoted by Dr. Babcock in an article* on agriculture in the secondary schools; part of the abstract of Mr. Bolster's address is so eminently adapted to any high school and shows so concretely the kind of work necessary for good botanical teaching in any school that the following illustration is given.

"The aims of the course were to give a little general knowledge of several sciences to show how all these sciences are related to agriculture, and last and most important, to develop the individual by teaching him to reason.

"We used no text but performed experiments which had a direct bearing on agriculture. We would state the experiment as a question and then try to answer the question. For example, How deep should seed be planted? When seeds germinate, what gas is given off? How may we best retain moisture in soils? How can we control alkali? Do vetches grow better if inoculated with bacteria, or if not inoculated? The material would be placed before the pupils. The method would be described and the precautions given. Then they would go about it and from the result draw their conclusion which was the answer to the question. But that was not enough. Take for instance an experiment whose relation to agriculture is least obvious. What gas is given off by germinating seeds? They came to the conclusion that carbon dioxide was given off. But what difference does it make whether this gas is given off or not? What bearing does that have on agriculture? If the experiment is left there, we have only learned an interesting fact which is of no use whatever. The experiment must be applied if it is to be made valuable. I try to draw from the pupil the application to agriculture by reasoning from one step on to another. What is carbon dioxide? A gas composed of carbon and oxygen. If carbon dioxide is given off by germinating seeds, what must be going on in the seed? Oxidation or burning, the same as in our bodies when we exhale the same gas, or when wood burns. Where does the carbon come from? From the seed itself. Where does

* Nature Study Review. November, 1909.

the oxygen come from? From air in the soil. Can this oxidation go on in the seed if there is no air in the soil? Certainly not. Then air must be present in the soil in order that seeds may germinate just as much as moisture must be present. This brings up the whole matter of soil ventilation — the whole matter of thorough preparation of the seed bed and the pupil begins to understand that tillage is just as necessary to give air to the seed as to keep the weeds down.

"By such experiments as this the pupil learns many valuable facts, but more than this his mind should be developed so that he can apply the same form of reasoning to experiments outside the school room and answer for himself questions which may arise in the mind of any normal boy or girl.

"But we do not stop even here. After hitting a point from as many sides as possible, we go out into the garden and try to apply our knowledge. If the knowledge learned in the laboratory cannot be applied in the field, then it is useless. We plant our seeds, we give them air and moisture, and after they begin to grow, we till the soil to give air to the roots and to retain moisture."

Professor Otis W. Caldwell has called attention to the fact that the high school unit in botany mentioned in the December TORREYA was the preliminary recommendation of the committee appointed by the North Central Association, and the final form of the recommendation is still in the hands of a sub-committee.

France from her state forests (18 per cent. of the entire country) derives an annual income of nearly two dollars an acre. But a better idea of the value of the works may be gained from France's success in establishing protective forests in regions subject to destructive floods — lands originally sand dunes and marshes. Immense forests of pines, with their dependent industries connected with the production of charcoal, turpentine, rosin, vinegar, etc., have wrought beneficial climatic and economic changes in the regions under government care.

Science reports a paper presented before the Botanical Society of Washington describing the differences between the wild rices of America and China. The Asiatic plant is given as a variety of the American by Engler and Prantl, but certain "significant characters indicate that the Asiatic plant is a distinct species from the American. The American plant is an annual, being reproduced by seed which falls off into the water as soon as ripe. The Asiatic plant is perennial, capable of reproduction by rhizomes. There are also some differences in the floral characters, these being most apparent in the form of the floral pedicel and in the length of the awns of the glumes."

Experiments conducted recently by Mr. A. E. Vinson at the Arizona Agricultural Experiment Station with regard to the influence of chemicals in stimulating the ripening of fruits have demonstrated that date fruits may be ripened into perfect commercial products in less than three days. The fruit sprays were subjected to acetic acid vapor from twelve to fifteen hours, which caused them to ripen without further treatment; the process can be hastened, it was proved, by exposing the dates to sunshine, or by heating (45° centigrade). It is hoped that this — or a similar process — will make possible the shipping of green dates, as the unripe fruit is firmer and less easily bruised than fresh ripe fruit. The chemical changes connected with rapid ripening of the fruit are given clearly in *Science* for October 29.

Science (May 28, 1909) states that "the amount of wood annually consumed in the United States at the present time is twenty-three billion cubic feet, while the growth of the forest is only seven billion feet. In other words, Americans all over the country are using more than three times as much wood as the forests are producing." Having recently visited Yellowstone Park, with its unnumbered cords of fallen trees, we wonder why some disposition cannot be made of the cords and cords of wood available there. These fallen trees — which form extensive, impenetrable barriers (often several feet high) are throughout the Park a constant eyesore to any one with a modicum of botanical

interest. The standing timber is much too dense, and it does seem as if the inventive Americans, with a wood famine so inevitable and so near, should be able to conduct our government reservations more economically.

The department of agricultural education of the University of Wisconsin is expanding its work in the endeavor to use effectively and wisely the annual appropriation of $30,000 of the state legislature. Under Professor Karl Hatch plans are being made, according to *Science*, "for assisting rural and high schools in their efforts to give effective instruction in agriculture. A traveling library of lantern slides illustrating various phases of dairying and farming has been provided which will be sent to schools for use. A collection of enlarged photographs of agricultural products and materials has also been prepared. An explanation of the methods of using the bulletins issued by the Experiment Station and the U. S. Department of Agriculture has also been provided, which is designed to make available for instruction the material in these official publications. The college of agriculture has arranged to have a number of its faculty deliver special lectures on teaching agriculture at county teachers' institutes."

School Science and Mathematics for January, 1910, has a short article on studying buds. The author (C. N. W.) says that "the average pupil has an idea that all buds contain flowers and that it may require some little effort to convince him that the leaf bud is far more abundant that any of the others, and that even this does not produce leaves merely, but a young twig as well." The following suggestions are included: (1) The lilac for the transition from scaly parts without to leaflike parts within; (2) the use of the buckeye instead of the horsechestnut, because of its non-sticky scales and its less woolly leaves; (3) bud protection by leaf petioles as shown in the common red raspberry, flowering raspberry, and catbrier, where the bud is protected not only to maturity (as in the sycamore) but through the winter by a petiole stub; (4) accessory buds in some oaks, forsythia, pipevine, and peach as well as hickory, walnut, and butternut; (5)

naked buds in the witch hazel, butternut, viburnum, and papaw, and the practically naked buds of catalpa, sumac, and ailanthus.

The Fourth Annual Report of the Forest Park Reservation Committee of New Jersey for the year ending October 31, 1908, contains, besides, the report of the committee, one by the state forester, Alfred Gaskill, and another from the forest fire service. The longer articles are by Mr. Gaskill on the planting and care of shade trees, by John B. Smith on the insects injurious to shade trees, and by Byron D. Halsted on the fungi of native and shade trees. The topics included contain such varied ones as the progress of forestry in New Jersey, state reserves, types of forest fires, methods of extinguishing and of controlling forest fires, shade trees, roadside trees, seashore trees, New Jersey tree nurseries, how to plant trees, tree guards, pruning, tree diseases, sprays and methods of spraying, and injuries due to soil conditions. The forty-odd illustrations are numerous, clear, and varied; each has a definite value and adds materially to the usefulness of the report. Several of the best have appeared in earlier state reports or botanical publications; mention might be made of the helpful figure on page 68 showing how to plant a street tree. To this readable report are appended the various laws affecting state and municipal parks, forests, the forest fire service, and tree planting. The report is designedly non-technical, apparently; it is a most readable account of what the state has done and is doing, and should interest the people of New Jersey in the greater improvement of public and private forest land.

In the *India Rubber World* issue of January 1, 1910, there appeared an article by Francis E. Lloyd, entitled "The Guayule Rubber Situation." Aside from stating in a general way, the factory processes in the manufacture of crude guayule rubber and the extent and future of the industry, the author gives an account of the early extraction of rubber from the plant by chewing. He tells of the discovery of the plant (*Parthenium argentatum*) to botanical science in 1852, and in giving a description of

its summer and winter appearance, discusses the production and viability of the seed and natural propagation of the plant by means of shoots springing from the shallow-lying roots. In briefly describing its anatomy and the occurrence of rubber and resin, the guayule is contrasted with latex plants, and the effects of irrigation upon the secretion of rubber are noted.

Among the conclusions drawn by the author, the following are the more important. If, despite the apparently small numbers produced, all the seeds which actually germinate in the field should survive, there would frequently be many more guayule plants than could find room to develop; that it would be difficult to completely eradicate guayule on account of the readiness with which shoots are formed from the roots; that under irrigation the ratio of the rubber producing tissue to the non-producing tissue is lowered by the relatively greater development of the wood cylinder and the reduction in thickness of the medullary rays; that finally the wood becomes harder and the stems show a strong tendency to run out into flowering shoots which die back. These disadvantages are compensated for, however, by the much more rapid rate of growth which, in irrigated plants, averages five to eight times that of field plants, the maximum rubber disposition in the former comparing favorably with that in the latter.

The paper is concluded with a description of the habitat of the plant and a résumé of the economic problems concerned with its culture. CHARLES S. RIDGWAY

NEWS ITEMS

Dr. Raymond H. Pond has recently accepted a position at the Agricultural Experiment Station at College Station, Texas.

Professor E. Dwight Sanderson has resigned the directorship of the Agricultural Experiment Station of the New Hampshire College.

Syracuse University will begin next fall courses in forestry and agriculture, leading to the establishment of a college of agriculture and forestry.

Mr. Frank D. Kern, of Purdue University, has been studying rusts at the New York Botanical Garden; Dr. J. C. Arthur also spent a short time in more general work at Harvard University.

Dr. and Mrs. N. L. Britton have sailed for Cuba on a collecting trip for the New York Botanical Garden; the Garden is also represented at present in the Bahamas by Dr. J. K. Small, and in Mexico by Dr. and Mrs. W. A. Murrill.

Applications for grants from the Esther Herrman building fund, the income from which is used temporarily in aiding scientific investigations, should be addressed to the secretary of the Torrey Botanical Club or to the secretary of the New York Academy of Sciences.

Dr. Louis Krauter, who was assistant professor of botany in the University of Pennsylvania, was frozen to death while hunting near Wildwood, New Jersey. The same fate met his companion, F. J. W. Macfarlane, son of Professor John M. Macfarlane of the same university.

Columbia University is offering through the department of botany a course of extension lectures on agriculture and agricultural methods. This series is designed to serve as an introduction to the extensive additions planned by the department, leading, it is hoped, to the establishment of schools of forestry and agriculture.

At the Boston meeting of the American Association for the Advancement of Science and affiliated societies the following botanists were elected to the positions designated: Dr. D. T. MacDougal (Desert Botanical Laboratory, Tucson), president of the American Society of Naturalists; Dr. F. L. Stevens (North Carolina Agricultural College), president of the American Phytopathological Society; Professor D. P. Penhallow (McGill University), vice-president of Section G; Dr. Erwin F. Smith (Department of Agriculture, Washington), Professor L. R. Jones (University of Wisconsin), and Dr. G. T. Moore (Missouri Botanical Garden) were, respectively, elected as president, vice-president, and secretary of the Botanical Society of America.

TORREYA

March, 1910

Vol. 10 No. 3

SUMMER NOTES ON THE MOUNTAIN VEGETATION OF HAYWOOD COUNTY, NORTH CAROLINA

By Roland M. Harper

In July and August, 1908, it was my privilege to spend a few weeks at the Biltmore Forest School, in the mountains of North Carolina, by invitation of the Director, Dr. C. A. Schenck. This school is located during the summer months in the "Pink Beds", a beautiful valley in the northern corner of Transylvania County, with its floor elevated about 3,200 to 3,300 feet above the sea. The Pisgah Ridge, with its crest varying in altitude from about 4,500 to 6,000 feet, forms the northwestern boundary of this valley and the southeastern boundary of Haywood County.

The Pink Beds valley seems to be unique in several respects, and considerably more field work would be necessary before one could do justice to its very interesting vegetation and ecological problems. But the mountains of Haywood County seem to be thoroughly typical of western North Carolina, and much of what follows will doubtless apply almost as well to any other county in the neighborhood.

While sojourning with Dr. Schenck I ascended to the crest of the Pisgah Ridge several times, and walked once over to Waynesville (the county-seat of Haywood County, distant 16 miles from the Pink Beds "as the crow flies" and nearly half as far again by the roads) and back. On the way over to Waynesville I followed the East Fork of Pigeon River most of the way, leaving it at its confluence with the West Fork and going thence nearly due west the remaining seven or eight miles. On the way back I went up the West Fork a few miles, then turned eastward and

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went over the summit of Cold Mountain, a sharp peak between the two forks, whose altitude is given by Buckley * as 6,105 feet, and on the topographic maps of the United States Geological Survey as between 6,000 and 6,100 feet. From Waynesville I also walked the railroad to Balsam, about eight miles southwestward and just over the line in Jackson County. This is about 3,300 feet above sea level, and is said to be the highest railroad station east of the Rocky Mountains.

Although a great deal of botanical work has been done in these far-famed North Carolina mountains ever since they were visited by Bartram and Michaux in the latter part of the 18th century, it has been mostly mere collecting, and the publications resulting from it, with very few exceptions, have been either works relating to trees only, notes on selected species, or narratives dealing with the flora or scenery rather than with the vegetation. So perhaps an attempt to classify the habitats of a small but typical portion of the mountain region, and arrange the species in each according to structure, relative abundance, etc., will not involve too much duplication of previous publications. Although the time I spent in Haywood County was very short, and I collected no specimens (so that some of my identifications are incomplete or uncertain), some of the generalizations which follow may be just as true as if they were based on a broader foundation, and some comparisons with other regions may be of interest.

As is well known to geographers, the mountains of North Carolina are as near normal as any in North America, having been brought to their present form almost entirely by erosion, with few or no complications due to faulting, unequal hardness of strata, glaciation, solution (*e. g.*, of limestone), volcanic action, etc. The topographic forms are consequently comparatively simple, consisting chiefly of ridges and valleys, most of them sloping equally on both sides and running in every possible direction, the former with sharp crests undulating but scarcely serrate, and the latter steep, rocky, and V-shaped toward their heads and broader, smoother, and more level lower down. There are no caves, sinks, natural lakes, islands, or cut-offs, and

* Am. Jour. Sci. II. 27: 287. 1859.

comparatively few precipices and waterfalls. These mountains are much less rocky than the glaciated ones of the North, for in the countless ages that they have been exposed to the weather all but the hardest and steepest rocks have become deeply buried in soil resulting from their own decay.

The following descriptions of vegetation are intended to apply only to areas more than 2,700 feet above sea-level. Below this rather arbitrary limit in Haywood County the country is scarcely mountainous, consisting mostly of broad valleys and low hills with fertile red soil, very largely under cultivation, and the vegetation does not differ greatly from that of the Piedmont region of the Carolinas and Georgia.

Above the altitude just mentioned the principal habitats in this county seem to be (1) mountain summits above 5,500 feet, (2) slopes and lower summits below 5,500 feet, (3) wet ravines or mountain rivulets, (4) rich ravines or steep coves, (5) river banks and bottoms, (6) gravelly and muddy river beds, (7) wet meadows, and (8) artificial or unnatural habitats.

In the following lists the species are divided into trees, shrubs and herbs, and then arranged as nearly as possible in order of abundance. Evergreens, when known, are indicated by heavy type, and vines by italics.* To make the lists more complete and determine the relative abundance of the species more accurately than would have been the case if I had adhered closely to political boundaries, I have included in my calculations notes made about a mile over the Jackson County line near Balsam, and along the crest of the Pisgah Ridge, where I was sometimes a few yards over the Transylvania County line. This will not introduce any perceptible error into the results.

The only mountain above 5,500 feet which I set foot on is Cold Mountain, already mentioned. The Balsam Mountains, a few miles farther west, are about 500 feet higher, and more densely wooded, but I did not have a chance to visit them, and little is known about the details of their vegetation. During about an hour spent on and near the sharp summit of Cold

* For explanation of a more elaborate method of treating habitat groups see Ann. N. Y. Acad. Sci 17: 36–41. 1906.

Mountain late in the afternoon of August 9 the following native species were noted. (This summit, like many others in the same region, has long been used for pasturage,* and there are of course a good many weeds on it. These will be found in the last list.)

TREES

Crataegus sp.
Fagus grandifolia
Abies Fraseri (1) †
Sorbus americana (2)
Betula lutea
Quercus rubra
Betula alleghaniensis?

SHRUBS

Rhododendron catawbiense (3)
Vaccinium sp.
Pieris floribunda
Cholisma ligustrina
Kalmia latifolia
Rhododendron punctatum
Salix humilis
Menziesia pilosa (4)

HERBS

Eupatorium ageratoides
Pteris aquilina
Danthonia sp.
Deschampsia flexuosa (5)
Heuchera villosa
Houstonia serpyllifolia (6)
Potentilla tridentata (7)
Houstonia longifolia
Lysimachia quadrifolia
Silene virginica
Hypericum Buckleyi
Polypodium vulgare
Epigaea repens
Selaginella rupestris
Habenaria ciliaris
Carex trisperma
Asplenium Filix-foemina
Circaea alpina (8)
Lilium superbum

It happens that on the same afternoon Dr. H. D. House was on the summit of Mt. Pisgah, on the edge of the same county, about six miles farther east and 300 feet lower, where he found many of the same species, and *Paronychia argyrocoma* besides. Quite a number of the same have been reported from similar habitats a little farther north by Dr. Harshberger.‡

* See Gray, Am. Jour. Sci. **42**: 41, 47. 1842; Redfield, Bull. Torrey Club **6**: 338. 1879; Scribner, Bot. Gaz. **14**: 255. 1889.

† Interesting notes on the species whose names are followed by numbers can be found as follows: (1) Gray, Am. Jour. Sci. **42**: 31, 42. 1842; Redfield, Bull. Torrey Club **6**: 338. 1879; Sargent, Gard. & For. **2**: 472. *f. 132.* 1889; Pinchot & Ashe, Bull. N. C. Geol. Surv. 6: 136, 223. 1898; (2) Gray, l. c. 28, 42. (3) Redfield & Gray, Bull. Torrey Club **6**: 336. 1879; Small & Heller, Mem. Torrey Club **3**[1]: 4. 1892; Cannon, Torreya **2**: 161–169. 1902; (4) Gray, Am. Jour. Sci. **42**: 42. 1842; Small & Heller, l. c. (5) Scribner, Bot. Gaz. **14**: 254. 1889. (6) Gray, l. c. 19, 40; Redfield, l. c. 337; F. E. Boynton, Pop. Sci. Mo. **31**: 654. 1887. (7) Gray, l. c. 27, 41; L. N. Johnson, Bot. Gaz. **13**: 270. 1888; Small & Heller, l. c. 14. (8) Harshberger, Bot. Gaz. **36**: 378. 1903.

‡ Bot. Gaz. **36**: 376–382. 1903.

The trees here, as in many other exposed places in different parts of the world, are very stunted, none over ten feet tall having been noticed, and they are mostly so scattered as to afford little shade. The *Crataegus* and *Fagus* together formed little groves or thickets on the northern slope near the summit, and curiously enough, could hardly be told apart at a little distance. The bark of both was smooth and gray, their leaves were of about the same size and color, and the *Crataegus* (apparently of the *coccinea* group) had ripe red fruit, about the same size as the involucres of the *Fagus*, which were also reddish-tinged.

The balsam, *Abies Fraseri*, seemed to be confined to north slopes too. It was not common on Cold Mountain, but considerable quantities of it were plainly visible on another peak of about the same height a few miles to the southward; and the Balsam Mountains are said to be covered with it, whence their name.

The herbs were scarcely stunted at all, doubtless because the larger ones are not evergreen, and thus escape the chilling blasts of winter. On the very highest point was a specimen of *Lilium superbum* about four feet tall, rearing its flowers above all other vegetation on the mountain.

The proportion of evergreens seems rather small for such an exposed habitat. Vines seem to be entirely absent, which however is not surprising. All but one of the shrubs belong to the Ericaceae.

About 20 per cent. of the species in the foregoing list are peculiar to the Appalachian region, south of the limits of glaciation, and the remainder are pretty widely distributed in the northeastern states. About one-fourth of the widely distributed species also extend as far south as Florida.

On the mountain slopes and lesser summits, from about 3,300 to 5,000 feet above sea-level, the flora is considerably richer, chiefly because this habitat is the most widespread and variable one in the region under consideration. The following species were noted in such situations in Haywood County or within a mile of its borders between the middle of July and the middle of August:

TREES

Castanea dentata
Acer rubrum
Quercus coccinea
" rubra
" Prinus
Halesia carolina
Tsuga canadensis
Robinia Pseudo-Acacia
Betula lutea
" lenta ?
Acer pennsylvanicum
" Saccharum ?
Picea australis ?
Fagus grandifolia
Acer spicatum

SHRUBS

Kalmia latifolia
Rhododendron maximum
Cholisma ligustrina
Vaccinium sp.
(same as on Cold Mt.)
Menziesia pilosa
Gaylussacia resinosa
Leucothoë recurva
Clethra acuminata
Azalea viscosa
Hamamelis virginiana
Hydrangea arborescens
Aronia nigra
Azalea viscosa glauca
Vaccinium corymbosum
Azalea lutea
Polycodium sp.
Sassafras variifolium
Corylus rostrata
Ceanothus americanus
Robinia hispida
Comptonia peregrina

HERBS

Pteris aquilina
Dasystoma laevigata
Coreopsis major Oemleri *
Koellia montana †
Dennstaedtia punctilobula
Cimicifuga racemosa
Galax aphylla
Zizia Bebbii
Stenanthium gramineum
Phlox glaberrima ?
Campanula divaricata
Nabalus sp.
Epigaea repens
Habenaria ciliaris
Melampyrum americanum
Silene stellata
Osmunda cinnamomea
Collinsonia canadensis
Lysimachia quadrifolia
Veratrum parviflorum ‡
Pedicularis canadensis
Dryopteris noveboracensis
Viola rotundifolia
Houstonia purpurea
Monotropa uniflora
Selaginella rupestris (on rocks)
Deschampsia flexuosa " "
Polypodium vulgare " "
Heuchera villosa " "
Chrosperma muscaetoxicum
Monarda clinopodia ?
Aster divaricatus ?
Polystichum acrostichoides
Dioscorea villosa
Houstonia longifolia
Silene virginica
Solidago caesia
Potentilla canadensis
Aletris farinosa
Porteranthus trifoliatus
Viola affinis §
Iris verna
Eupatorium purpureum ?
" ageratoides
Lilium superbum
Erigeron pulchellus
Angelica villosa
Seriocarpus asteroides
Andropogon furcatus
Ligusticum canadense
Actaea alba
Chrysopsis Mariana
Angelica atropurpurea
Hieracium paniculatum
Caulophyllum thalictroides

* See Gray, Am. Jour. Sci. 42 : 46. 1842.

† See Gray, Am. Jour. Sci. 42 : 43, 47. ‡ See Gray, Am. Jour. Sci. 42 : 26.

§ Identified by Dr. House, who accompanied me on some of my walks along the Pisgah Ridge.

In this habitat, or group of habitats, the trees overshadow all the other vegetation, except on the very summits of the ridges, but they hardly make the dense shade characteristic of a climax forest. Some of the herbs have thickened or reduced leaves, and are capable of flourishing in perfectly treeless habitats, while others are distinctly shade-loving, having thin and broad leaves. The scarcity of pines, other evergreens, and vines is noteworthy.*

About two thirds of the shrubs and two or three of the herbs belong to the Ericaceae and allied families. Compositae, Umbelliferae, and Melanthaceae are also pretty well represented. Only about 12 per cent. of the angiosperms are monocotyledons.

Between 15 and 20 per cent. of the species seem to have their centers of distribution right in these mountains, though none are confined to North Carolina. Many of the remainder are common on bluffs in all the southeastern states, and still more are widely distributed in various habitats in the northeastern states. A large proportion of them have been reported from the mountains of New York by Dr. Harshberger.†

The wet rocky ravines at the heads of streams have a characteristic and interesting but not very rich flora. This habitat seems to be much better developed in the Pink Beds than in the parts of Haywood County that I visited, where I found only the following species in it :

SHRUBS	HERBS
Rhododendron maximum	Houstonia serpyllifolia
	Chelone Cuthbertii ?
	Impatiens biflora
	Chelone glabra
	Diphylleia cymosa ‡
	Osmunda cinnamomea
	Thalictrum clavatum §
	Carex gracillima ?
	Aconitum uncinatum ?

* This type of forest corresponds with a part of Ashe's "forests of the higher mountains" (Bull. N. C. Geol. Surv. 6: 219–222. *pl. 25.* 1898), and more exactly with the "chestnut slope type" described by F. W. Reed in the vicinity of Grandfather Mountain (Bull. U. S. Bureau Forestry 60: 12–13. *pl. 5.* 1905).

† Torreya **5**: 187–194; Plant World **8**: 276–281. 1905.

‡ See Gray, Am. Jour. Sci. **42**: 23. 1842; Redfield, Bull. Torrey Club **6**: 338, 339. 1879.

§ See Gray, l. c. 17; Redfield, l. c. 338; Small & Heller, Mem. Torrey Club **3**^{1}: 7. 1892.

About half of these are typical southern Appalachian species. The remainder range farther north.

Some small ravines or steep coves are so filled with deep rich humus or colluvial soil that no water appears above ground in them in ordinary weather. Such places have a decidedly climax vegetation, comprising the following species:

TREES

Tilia americana
Halesia carolina
Castanea dentata
Robinia Pseudo-Acacia
Aesculus octandra
Cornus florida
Tsuga canadensis
Acer rubrum
Liriodendron Tulipifera
Nyssa sylvatica
Hicoria alba
Fagus grandifolia

SHRUBS

Calycanthus fertilis

HERBS

Eupatorium ageratoides
Cimicifuga racemosa
Dryopteris noveboracensis
Phegopteris hexagonoptera
Astilbe biternata *
Caulophyllum thalictroides
Osmunda Claytoniana
Sanguinaria canadensis
Adiantum pedatum
Dioscorea villosa
Disporum sp.
Phryma Leptostachya
Circaea lutetiana
Meibomia nudiflora
Eupatorium trifoliatum ?
Arisaema triphyllum
Lappula virginiana
Scutellaria sp.
Koellia montana
Agrimonia sp.
Cynoglossum virginianum
Falcata comosa
Aster divaricatus ?
Adicea pumila
Cypripedium parviflorum ?
Collinsonia canadensis
Cypripedium acaule
Osmunda cinnamomea
Dryopteris intermedia ?
Trillium undulatum ?
Botrychium virginianum
Thalictrum dioicum ?
Geranium maculatum
Aristolochia Serpentaria
Campanula americana
Urticastrum divaricatum

In this list there is only one evergreen, and that is not abundant. The scarcity of shrubs is rather surprising, but perhaps not very significant. Plants with biternate, pinnately compound, or otherwise much dissected leaves are numerous. (*Cimicifuga*, *Astilbe*, *Caulophyllum*, *Thalictrum*, and the seven ferns are good

* See Gray, Am. Jour. Sci. 42 : 37–38. 1842.

examples.) Half the trees have wind-borne seeds, but among the herbs a large proportion have berries or burs, adapted to be carried off by animals, as is the case in many climax forests.

About 15 per cent. of the angiosperms are monocotyledons. The total absence of the Ericaceae and their allies is significant. The polypetalous families are well represented here, as in many other parts of the north temperate zone where climax vegetation prevails (the Tennessee valley of Alabama for instance).

Only about 10 per cent. of these species can be regarded as typical or characteristic mountain plants. Most of them are common to all parts of temperate eastern North America where there are climax forests. There is an especially striking resemblance between this list and that for certain shaded hillsides in the Paleozoic region of Georgia, and even the valleys at the heads of some of the bays on the northwestern shore of Long Island, particularly that of Little Neck Bay just within the limits of New York City, which I had examined about a month before I went to North Carolina. The majority of those listed here occur in somewhat similar habitats in southeastern Pennsylvania, according to Dr. Harshberger,* and nearly half extend to Southwest Georgia † and the corresponding parts of Alabama.

On the banks of the two forks of Pigeon River already mentioned, between 2,700 and 3,300 feet above sea-level, the following species were noticed:

Trees	Shrubs
Fagus grandifolia	**Rhododendron maximum**
Halesia carolina	Alnus rugosa
Quercus imbricaria	**Leucothoë Catesbaei**
Quercus alba	**Kalmia latifolia**
Tsuga canadensis	*Vitis aestivalis?*
Acer rubrum	Hamamelis virginiana
Carpinus caroliniana	*Rhus radicans*
Aesculus octandra	Ceanothus americanus
Pyrus coronaria	*Lonicera* sp.
Crataegus sp. ‡	Pyrularia pubera §
Tilia heterophylla ?	
Robinia Pseudo-Acacia	

* See Bull. Torrey Club 31: 143–148. 1904.

† See Bull. Torrey Club 31: 15–16. 1904.

‡ Probably of the *coccinea* group. Fruit ripe August 7, 3 seeded.

§ See Gray Am. Jour. Sci. 17: 22. 1842.

TREES (continued)	HERBS
Cornus florida	Dryopteris noveboracensis
Platanus occidentalis	Epiphegus virginiana
Magnolia acuminata	Cimicifuga racemosa
Castanea dentata	Polygonum virginianum
Quercus velutina?	Podophyllum peltatum
Acer Saccharum?	Meibomia nudiflora
Juglans nigra	Phryma Leptostachya
Fraxinus sp.	Geum canadense
Prunus serotina	*Clematis virginiana*

Here the trees outnumber the shrubs and herbs, and there are more vines than in any other habitat in the region. This preponderance of trees and vines seems to be characteristic of river banks and alluvial swamps in many other parts of the world.* Rivers as a rule are bordered by vegetation approaching the climax, but at this altitude of 3,000 feet there is still so much erosion going on that the normal succession is retarded, which probably accounts for the abundance of four evergreens.

Few if any of the species in this list can be considered as peculiarly Appalachian. Nearly all of them are common in the Piedmont region from Pennsylvania to Alabama, as well as in the Mississippi valley; and several are still more widely distributed.

In the gravelly and muddy beds of the same streams, which must be covered with water half the time, the following herbs find a congenial habitat:

Polygonum sagittatum	Rhynchospora glomerata
Impatiens biflora	Carex lurida
Juncus effusus	Scirpus polyphyllus
Hypericum mutilum	Lobelia cardinalis
Eupatorium perfoliatum	Mimulus ringens

The fact that four of these, or 40 per cent., are monocotyledons, is probably not without significance. All of them are pretty widely distributed, mostly northward.

Near Davis Gap (sometimes called Pigeon Gap), about three miles east of Waynesville, and near Balsam Gap, about seven miles southwest, are the only wet meadows which I made note of in the region under consideration. Both are about 3,300 feet

*See Ann. N. Y. Acad. Sci. 17: 67–73, 103–104. 1906.

above sea-level. The cause of the treelessness of such areas, and their relations to other habitats in the neighborhood, are unsolved — though perhaps not very difficult — problems. With the exception of *Acer rubrum* and *Salix longipes*, scattered along stream channels at Balsam Gap, the vegetation is entirely herbaceous, as follows :

Eupatorium perfoliatum	Osmunda regalis
Vernonia noveboracensis	Hypericum mutilum
Panicularia nervata	Helenium autumnale
Homalocenchrus virginicus	Oxypolis rigidior
Juncus effusus	Cyperus strigosus
Eryngium virgatum	Mimulus ringens
Scirpus sylvaticus	Galium trifidum ?
Rhynchospora glomerata	Apios tuberosa
Carex lurida	Carex crinita
Linum striatum	Juncus canadensis ?
Polygonum sagittatum	Gerardia purpurea ?
Osmunda cinnamomea	Habenaria ciliaris

All of these are just as common outside of the mountains as they are here, if not more so. Most of them can be found in wet meadows in New England, and a still larger proportion along the head-waters of East Meadow Brook, near Hempstead, Long Island ; and all range at least as far south as Middle Georgia, about 100 miles farther south and 2,500 feet lower.

All the species seem to be perennial, but none are evergreen in the ordinary sense of the word. Nearly half the angiosperms are monocotyledons. There are no Ericaceae among them.

The weeds of the mountain region are found principally along trails and roads and in pastures and abandoned fields. They are all or nearly all herbs, and mostly dicotyledons. The following list is doubtless very incomplete. The species are arranged approximately in order of abundance, as usual.

Juncus tenuis *	Chrysanthemum Leucanthemum
Prunella vulgaris	Achillea Millefolium
Potentilla canadensis	Veronica officinalis *
Rumex Acetosella	Polygonum Hydropiper
Lobelia inflata	Trifolium repens
Verbascum Thapsus	Oxalis stricta ?

* See Gray, Am. Jour. Sci. 42 : 41. 1842.

Verbena urticaefolia
Carduus lanceolatus
Polygonum pennsylvanicum
Fragaria virginiana
Pteris aquilina
Plantago major
Solanum carolinense
Diodia teres
Cerastium vulgatum ?
Agrimonia sp.
Hedeoma pulegioides
Potentilla monspeliensis
Erigeron ramosus
Daucus Carota
Ambrosia artemisiifolia
Plantago lanceolata
Lepidium virginicum
Polygonum aviculare
Bidens bipinnata
Lespedeza striata †
Euphorbia corollata
Anthemis Cotula
Euphorbia maculata
Erechthites hieracifolia
Leptilon canadense
Trifolium pratense
Gnaphalium purpureum
Acalypha gracilens
Oenothera biennis
Gnaphalium polycephalum
Euphorbia Preslii

Of these weeds about 28 per cent. are supposed to have been introduced from Europe and 2 per cent. from Asia, while the remaining 70 per cent. are considered indigenous by nearly all systematists. And yet all the supposed natives, with five or six exceptions, are confined to unnatural habitats, exactly like the introduced species, from which there is no possible way of distinguishing them without the use of botanical literature, such as a manual, and even that is not infallible. At least half, perhaps two thirds, of the species in the above list evidently belong to that class of native weeds (mutants ?) which I discussed just before going to North Carolina.‡

College Point, New York

MAGNOLIA AT FLORISSANT §

By T. D. A. Cockerell

The Miocene flora of Florissant, Colorado, includes so many genera living today in the southeastern states, that the apparent absence of *Magnolia* has seemed remarkable. During the past summer, however, a leaf which may I think be referred to this

* See Gray, Am. Jour. Sci. 42 : 27. 1842.

† See Gattinger, Fl. Tenn., 107. 1901.

‡ Bull. Torrey Club 35 : 347–360. July, 1908.

§ Illustrated with the aid of the Catherine McManes fund.

genus with confidence, has been found by Mr. Terry Duce, and is herewith recorded.

Magnolia florissanticola n. sp.

Leaf apparently thick, shaped as in *M. grandiflora*; apex lacking, but length apparently about 130 mm.; broadest about 42 mm., from base; base broad-cuneate, slightly inequilateral,

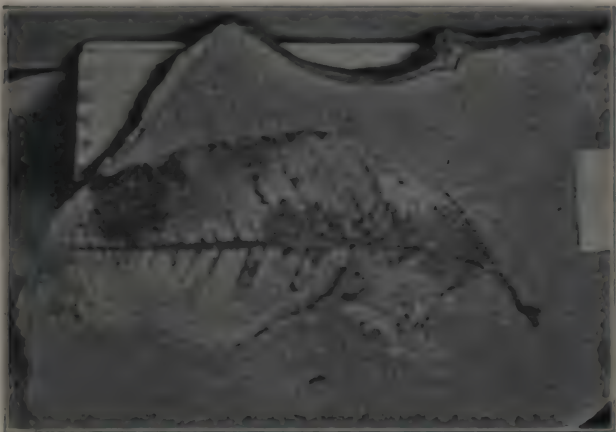

FIGURE 1. *Magnolia florissanticola*. Miocene shales of Florissant.

from a very stout (3 mm. diam.) twisted petiole, which is about 16 mm. long, arising from a clasping base; width of blade about 50 mm., tapering apically, so that at 80 mm. from base the width is 38 mm.; margin entire; venation as in *M. grandiflora*, the strong lateral veins averaging about 5 mm. apart. Miocene shales of Florissant. (*Terry Duce.*)

REVIEWS

Spalding's Distribution and Movements of Desert Plants*

The author has divided his problem into seven divisions, under as many headings. Five of these appertain to various phases of his problem, the last two are mainly recapitulative.

Tumamoc Hill and its environs, near the desert botanical laboratory, Tucson, Arizona, was the place chosen where "prolonged observational and experimental work could be undertaken." The first section of the paper (pp. 5–27. *pl. 1–12*) is taken up with a clear and logical account of the plant associations and habitats as they have appealed to the author. Appended to this is an account of the lichens of the region, written by Dr. Bruce Fink.

Leaving the section on plant associations and habitats which, though valuable, is necessarily becoming more and more stereotypic in each succeeding ecological paper, we come to the most interesting part of the whole work. In this second chapter (pp. 29–66. *pl. 13–24*), the author gives an account of the local distribution. He writes: "Dealing more in detail with constituent species of the associations, the attempt to trace cause and effect is carried a step farther. Certain species have been carefully mapped and their habits have been more thoroughly studied with reference to differences of soil and aspect."

The species selected for this study are plants "with a remarkable definiteness of habitat preference"; they are *Encelia farinosa*, *Larrea tridentata*, *Cereus* (why not *Carnegiea?*) *giganteus*, *Cercidium Torreyanum*, and *Prosopis velutina*. A distribution-map for each of these species is included, and they form a series of invaluable notes. Each map is practically a graphic census of the individuals of the species under discussion. Nothing could have been found to indicate so well the relative density of these plants. The various soil formations are critically studied, and following as they do the various distribution-maps mentioned above, they are at least a suggestion of the factors the author credits with the

*Spalding, V. M. Distribution and Movements of Desert Plants. Pp. 1–144. *pl. 1–31*. 22 Oct. 1909. Carnegie Institution of Washington, Publication No. 113.

control of the distribution of these plants. Other regulative factors, such as temperature, rainfall, humidity, etc., all carefully measured, come in for their share of attention.

Still under the general heading of local distribution are sections devoted to dispersal, invasion, competition, and succession, in which the author attempts to trace some of the other factors bearing on the distribution of the plants in the area studied. A section on the root system of *Cereus giganteus* is here introduced by Dr. W. A. Cannon.

Space forbids an account of the chapter on environmental and historical factors. There are included within it sections on the geology and soils of the region written by C. F. Tolman and B. E. Livingston respectively.

Chapter four is taken up with the vegetation groups of the desert laboratory domain and is contributed by Professor J. J. Thornber. It contains lists of the plants growing on the various major formations found in the area, and also considerable statistical matter.

The chapter on the origin of desert floras is contributed by Dr. D. T. MacDougal. This brings into co-relation much of what has been treated specifically in earlier parts of the work. Some of this section has already seen the light in the *Plant World* for September, 1908.

Dr. Spalding has collected and put on permanent record a mass of very interesting and essential facts dealing with the subject in hand. Throughout there is a creditable hesitancy in drawing conclusions, some of which might have been warranted in view of the wealth of detail. The statistical and graphic part of the work is splendid; and work like this and that done by Jennings and others will undoubtedly serve as the bases of numerous ecologic palimpsests.

The illustrations and typography are all that could be desired.

Norman Taylor

PROCEEDINGS OF THE CLUB

January 26, 1910

The Club met at the Museum of the New York Botanical Garden at 3:30 P. M., with Vice-president Barnhart in the chair. Twenty-five persons were present. After the reading and approval of the minutes of January 11, the resignation of Dr. Cyrus A. King, 661 Flatbush Ave., Brooklyn was read and accepted.

The chairman of the field committee reported that 25 meetings were advertised during the season, of which 23 were held. The total attendance at these meetings for the year was 92.

The expenses incurred by the committee for printing and mailing the circulars has been considerable, and it was suggested that future notices which cannot be printed in the Academy Bulletin be printed in Torreya.

Collections made for the Club herbarium aggregrated during the season 2,400 specimens; 1,750 of which were collected by the committee and about 500 specimens were secured by Mr. G. V. Nash in northwestern New Jersey and adjacent Pennsylvania. Material has been received also from other members.

The following committees of the Torrey Botanical Club were appointed by the president for the year 1910:

Finance Committee: Eugene P. Bicknell (chairman) and H. M. Richards.

Committee on Admission: J. K. Small (chairman), G. V. Nash, and C. C. Curtis.

Program Committee: Fred J. Seaver (chairman), Tracy E. Hazen, Jean Broadhurst, Charles L. Pollard, and E. G. Britton.

Field Committee: Norman Taylor (chairman), E. B. Southwick, and Wm. Mansfield.

Committee on Local Flora: N. L. Britton, chairman; Phanerogams — N. L. Britton, C. C. Curtis, Eugene P. Bicknell, K. K. Mackenzie, E. S. Burgess, and E. L. Morris; Cryptogams — Wm. A. Murrill, E. G. Britton, Tracy E. Hazen, M. A. Howe, and Philip Dowell.

Committee to consider the subject of revision of the by-laws: Edward S. Burgess, John Hendley Barnhart, Percy Wilson,

Marshall Avery Howe, William Mansfield, Jean Broadhurst, Philip Dowell, Alex. W. Evans, Tracy E. Hazen, William Alphonso Murrill, Charles Louis Pollard, Herbert M. Richards, Addison Brown, Fred J. Seaver, Norman Taylor, and N. L. Britton.

As a special committee for securing funds to provide speakers on the second Tuesday evening of each month: Jean Broadhurst (chairman), Tracy E. Hazen, and N. L. Britton.

A letter was read from Dr. Howard J. Banker of the department of biology, DePauw University, making application for one hundred and fifty dollars from the Esther Hermann Fund to aid him in his studies on Hydnaceae. Dr. Banker proposes to visit some of the European herbaria during the coming summer for the purpose of studying type material of this family.

This communication was approved and the secretary was instructed to forward it to the Council of the New York Academy of Sciences.

The scientific program consisted of two papers, of which the following are abstracts prepared by the speakers.

"The U. S. Experiment Station at Sitka, Alaska", by Miss Jean Broadhurst:

The visit to the Experiment Station at Sitka was made as a side trip when returning from the Hawaiian Islands to the United States, and afforded many striking contrasts fully summed up in the expression "from tree ferns to glaciers." Following the inland route from Seattle, the site of one of the most pleasing American expositions, we spent twelve days on the steamer Spokane, making stops at various points of interest: fishing villages; Kasaan, a deserted Indian town with its ghostly totems; an Indian mission settlement; Muir Glacier; the Treadwell gold mine, with the famous "Glory Hole"; Juneau, the governmental center and chief city; Skagway, which was our "farthest north" for the summer; and Sitka, which despite the rise of Juneau, still holds its own with its old Russian fort and the Greek church containing the famous Sitka Madonna.

The weather was real Alaskan weather, partly cloudy and mostly rainy. The short stops did not (after the special object

of the visit had been accomplished) allow trips to regions far from the beaten paths ; at Skagway, *train* connections afforded a twenty-mile trip into the interior to the summit of the White Horse road ; at Sitka, a walk to the Experiment Station, less than a mile from the town, revealed some interesting plants in the low ground traversed.

This station — like most of those in Alaska — is a simple unpretentious structure. Mr. Georgeson, the superintendent, lives in a large frame house near the wharf, and this house serves also as herbarium rooms and office ; but the station consists of a small, frame house and two small greenhouses, with a few acres of cleared and cultivated ground. The station supports but one man beside Mr. Georgeson, Mr. De Armand, from the Kansas State Agricultural College. Labor is high — the poorest type of Indian demanding two dollars a day — and much of the actual work is therefore done by the officials, who elsewhere would be free to direct the work and plan new departures. The actual results, which at first seem disappointing, are lessened also by the great cost of preparing land — about $500 an acre ; for, besides clearing and breaking new land, drainage and fertilizing are most expensive processes in the preparation of the ground. A record of 220 days with rain or snow to 95 clear days (the rest of the year being cloudy or partly cloudy) is not unusual for Sitka. This means a minimum rainfall of 80 or 90 inches a year, and gives a water-soaked soil that is difficult to plow or prepare early in the year, and too wet for most plants much of the growing season. The soil of this region — mostly volcanic ash — is poor in humus ; seaweeds and fertilizers used so helpfully in other countries are of little benefit here, because they do not decay readily in the cool summers of Sitka. For, at Sitka, the greatest limitation is due, not to short summers but to the lack of heat during the growing season, the actual heat units of effective temperature (above 43° F.) being less than 1,500, while Ottawa has over 3,400 and Stockholm 2,700. The winters here are not severe ; often, the ponds near the station do not freeze to allow skating. Frost along the coast may not be experienced from May 1 to October 1, or even November 1. The interior of

Alaska, with shorter warmer summers (frost sometimes in August) and colder winters (sometimes 70° below zero) boasts of fruits and grains that are impossible at Sitka. Grains often fail to mature, because the wet soil prevents timely planting, the stalks do not harden sufficiently to allow easy cutting, and the limp sodden growth is good for forage only. Potatoes never mature so the skin will not slip, and good results require that they be sprouted indoors and "set by hand with extra care." Apples ripen slowly (our fall apples do not mature at all there) and the native crab with cherry-like fruit is considered a necessary stock for grafting our less hardy varieties. The grafts "winter-kill", because the buds and the woody twig substances do not complete their development in the slow growth of the summer. To initiate the usual winter preparations the twigs are sometimes stripped of their leaves, a method which often proves successful. The native strawberries, which grow down to tide water, are being successfully crossed with cultivated varieties; and the red raspberry is forced indoors in the endeavor to secure successful hybrids with the large native salmon berry. Small plums, tiny cherries, little cranberries (chiefly *Vaccinium*), and currants are wild there. The introduced vegetables which are fairly successful are Brussels sprouts, cauliflower, kale, lettuce, parsley, onion, rhubarb, and peas. Beans do not do very well.

Kenai and Kadiak, two other government stations, are devoted chiefly to cattle-breeding and the improvement of cattle foods. Rampart and Copper Center are farther north, but farther inland; the winters are much more severe, but the shorter, warmer summers allow better results with grains and vegetables. Hay here is quoted at $200 a ton and retails at $0.20 a pound at the road-houses.

The problems in Alaska are not the simplest in the world, and the workers there do not hope to make of it a garden spot or an agricultural center. If the investigators can add variety to the present limited food supply, or enable Alaska to become more nearly self-productive of the food required for man and his domesticated animals, they will more than justify the moderate government assistance now given them.

"The Culture Methods of Studying Plant Rusts", by Mr. F. D. Kern:

The first experiments in the culture of plant rusts were made by DeBary and Oersted in 1865. For a number of years after this many botanists were very skeptical. It was not an easy matter to believe that what had been considered separate and distinct genera of parasitic fungi could really be only different stages of one species. Through the work of a number of mycologists the study of rusts by means of cultures has been advanced with results that are now well known. The methods employed by the bacteriologist are familiar. He makes up artificial culture media of various sorts, and from a sowing of a certain kind of bacterium he obtains a crop of the same sort, if his culture is a successful one. With the rusts the story is quite a different one. They are strictly parasitic and living plants must take the place of culture media. The best success has been attained by carrying on the work under glass. Potted plants with vigorous roots and rather small tops are most desirable. The proof that different forms on unlike hosts are only stages of the same species is obtained by sowing spores taken from one host on another host and raising a crop of spores wholly unlike the ones sown. Take for example the rust of corn (*Zea Mays*). It has been found by means of cultures that the spores formed on the corn leaves in the fall cannot be made to grow upon corn again. One spring recently it was noticed that some sorrel (*Oxalis*) plants growing near a pile of rusted corn stalks were badly infected with rusts. From this observation in the field it was thought possible that the corn rusts might be associated with the *Oxalis* rust. Such proved to be the case. The spores taken from the corn will produce rust on the *Oxalis* and vice versa. There is much need for further studies and observations of this sort. The cultures are best made in a greenhouse with plants that are grown in pots. Suggestions as to relationships must, however, be obtained in the field and there is an opportunity here for much valuable work.

The auditing committee reported that the books of the treasurer had been examined and were found to be correct.

PERCY WILSON, *Secretary*

OF INTEREST TO TEACHERS

Note-Books in High School Botany

By Willard N. Clute

I think I have partially solved the problem of botanical note-books by a scheme of allowing certain pupils to answer the questions in the laboratory work by drawings, instead of written work. In buds, for instance, the question may be asked, "Do underground plants produce buds?" One pupil would hunt up some underground plants and answer "yes"; the others would make a drawing of such buds. For bud protection one would describe how buds are protected; another would make drawings to show this. All notes that cannot be answered by drawings must be in the temporary note-book, but those who draw their answers are excused from the written work of the permanent note-book. One course takes about as long as the other, but most pupils prefer the drawing; it is certainly easier for the teacher and I am inclined to think is fully as useful in teaching form and structure.

A lecture on water purification plants, one of a series in sanitary science at Columbia University, is announced for April 26.

An injunction issued by Secretary Ballinger after a personal inspection of the region has at least delayed the appropriation of the Hetch-Hetchy valley by San Francisco as a municipal water reservoir.

Cacti and desert plants for schools, gardens, and conservatories may be obtained from Mr. J. C. Blumer, Box 684, Tucson, Arizona.

A well-indexed and fully-illustrated government bulletin (No. 166) has just been written by William L. Bray on The Mistletoe Pest in the Southwest. The hosts, life history, and methods of combating the mistletoe are the main topics included in this clearly-written pamphlet of about forty pages.

A paper read by Dr. Roland M. Harper before the American Geographers at the Boston meeting of the American Association for the Advancement of Science describes a natural prairie on Long Island. The natural prairie of about fifty square miles, known locally as "Hempstead Plains," was treeless when the country was first settled; and a considerable part can still be seen in its natural condition, though it is situated in a country with about 300 inhabitants per square mile.

Secondary education in agriculture was discussed by Director A. C. True at the Association of American Agricultural Colleges and Experiment Stations (Portland, Oregon, August, 1909). It was recommended (1) that agricultural colleges give credit in their entrance requirements for agricultural subjects properly taught in the secondary schools; (2) that agricultural colleges should have a definite legal relation to the public school system; (3) that agriculture should be generally introduced into the high schools; and (4) that there should be a limited number of special state agricultural high schools.

The *Outlook* (February 5) describes fully an interesting phase of the Farmers' Coöperative Demonstration Work of the Bureau of Plant Industry which focuses upon the farmer boy. Through the coöperation of the Bureau and of the state and county school authorities, boys are led to agree to plant and care for one acre of corn each. Advice, seeds, etc. are furnished by the Bureau; the soil, usually by the boys' fathers; and prizes, by local civic organizations, private individuals, etc. Four such prizes for 1909 sent four southern boys to Washington for a week, and Secretary Wilson presented them with certificates of merit. Last year there were 12,000 boys in the corn clubs under Dr. Knapp's care, and the Bureau estimated that these clubs will register over 35,000 boys next year.

In the recent report of Professor Willis L. Moore, chief of the Weather Bureau, the relation of forests and rainfall is discussed and the statement is made that one is entirely independent of the

other. It is said that his opinion is shared by Professor Cleveland Abbe, the first weather forecaster of the federal government and Professor W. J. Humphreys, of Johns Hopkins University, and practically all meteorologists who have taken the trouble to look into the matter. The claim is made that drouths and excessive rain, as well as prolonged departures from the normal temperatures of a region, are due to eccentricities in the distribution of atmospheric pressure; these eccentricities of air pressure are traced back to the interchange of atmosphere between the equatorial and polar regions, the routes and intensity of the great currents undergoing more or less modification from time to time. These arguments lead Professor Moore to say that the causes of climatic change are general, not local; and he vigorously attacks the widely-accepted statement that removal of forests can diminish the rainfall. The instances on record of lessened precipitation after a particular area has been cleared he regards as mere coincidences, which will be proven to show no forest connection if observatian is continued for a sufficiently long period. No other meteorological phenomenon, it is said, is so variable as rainfall, and any one who studies the figures for too short an interval is likely to be deceived.

Botanists, however, will not accept readily this coincidence theory and a lively discussion will doubtless follow the publication of this report.

NEWS ITEMS

Dr. Carlton C. Curtis has been advanced from assistant professor to associate professor of botany and Dr. Tracy E. Hazen from instructor to assistant professor of botany in Columbia University.

Professor Charles Fay Wheeler, expert in charge of the economic gardens, Bureau of Plant Industry, United States Department of Agriculture, since 1902, died March 5. Professor Wheeler was formerly instructor in the Michigan Agricultural College, and consulting botanist for the Michigan Experiment Station.

George Plumer Burns, director of the Botanical Garden and junior professor of botany in the University of Michigan, has accepted an appointment as professor of botany in the University of Vermont. He was graduated from the Illinois State Normal School, 1891; B.S. and A.M. Ohio Wesleyan University, 1898; Ph.D. University of Munich, 1900. In 1907–8 he was instructor in botany in Ohio Wesleyan, then after two years of work with Goebel, went, in January, 1901, to the University of Michigan, where he has since remained.

Charles Reid Barnes, professor of plant physiology in the University of Chicago since 1898, died on February 24, in the fifty-second year of his age, as a result of a fall upon an icy sidewalk, which brought on a cerebral hemorrhage. He was instructor and professor in natural science lines in Purdue University from 1880 to 1887, and from 1887 to 1898 was professor of botany in the University of Wisconsin. His two best known works are perhaps his "Analytic Keys to the Genera and Species of North American Mosses" (revised by F. D. Heald, 1897), and "Outlines of Plant Life" (1900). He was the author also of scholarly papers relating to plant physiology and of many critical reviews. Professor Barnes had been a co-editor of the *Botanical Gazette* since 1883. He was president of the Botanical Society of America in 1903 and was a prominent and active member of the American Association for the Advancement of Science.

TORREYA

April, 1910

Vol. 10 No. 4

A PLANT-CASE FOR THE CONTROL OF RELATIVE HUMIDITY

By W. T. Boyie

In connection with some work on the non-available water in soils the writer has devised a plant-case in which plants can be grown under conditions of constant humidity. The apparatus has given excellent satisfaction, not only in its efficiency for controlling humidity, but also because it has made it possible to determine, within a reasonable degree of accuracy, the time of death of the plants. This is a necessity in non-available water determinations. The relative humidity is controlled by forcing a current of dried air into the plant-case by means of an air pump, at a rate necessary to balance the moisture given off by the plants. It is often desirable to control humidity conditions when working with plants; and as far as known to the writer the only published description of a humidity balance is that of a case devised by Gregaire and Hendrick.* This publication has not been accessible to me.

The plant-case is a cubical box, two feet on a side. The top and four sides are made of plate glass, one-fourth of an inch thick. Any kind of glass will do provided it be free from irregularities which might refract the light-rays, like a lens.

The frame of the case is made of wooden pieces fitted together with screws, and so arranged as to hold the glass sides as a window pane is held in its sash. All of the glass is set in asphalt. Asphalt is also used to close the joints where the several pieces of the frame are fastened together. The front of the case contains a door, which is held, by means of twelve

* Reported by A. Petermann (Bul. Inst. Chim. et Bact. Gembloux, 70: 22–3. 1901). See Exp. Sta. Rec. 13: 1018. 1901–02.

[No. 3, Vol. 10, of Torreya, comprising pages 52–76, was issued March 31, 1910.]

bolts, in practically air-tight contact with its bed, which is cut into the case frame. The bottom of the case is of wood, covered inside with a continuous sheet of tin.

The pump used for forcing air into the case was made by the local tinner at an expense of twenty-five cents. The cylinder of the pump is four inches long and two inches in diameter. A pump of this size will deliver, approximately, one hundred cubic centimeters of air at each stroke, and, at a rate of eighty strokes per minute, it will change the air in the plant-case every thirty minutes.

The air passes from the pump into a filter-flask, which serves as a "stuffing-box," from which it passes into the series of wash-bottles at a more uniform rate than it would if the pump were connected directly with the wash-bottles. Considerable acid is swept along by the air, from one wash-bottle to the next. This exposes much more surface of acid to the air, but necessitates the inclusion of a bottle at the end of the series to catch the acid thus carried over.

An electric fan, within the case, keeps the air well mixed. A thermograph of convenient size, a recording hygrometer, and a small hygrometer of the "Mitthof's" pattern were also kept in the case. This latter instrument is much more sensitive than the recording hygrometer, and thus indicates any temporary variations in the humidity.

The air in the case can be reduced from saturation to approximately 10 per cent. (hygrograph record) in 12 hours, even when the case is full of living plants. In these experiments the air was continually kept as dry as possible, but the humidity could have been maintained at any desired per cent. within a range limited only by the sensitiveness of the hygrometer used, had the index-arm of the hygrometer been made to open and close mercury switches, operating the circuit of the electric motor which drives the pump. The current of dry air would then have ceased when the desired humidity was reached.

As stated above, the time of death of the plants grown in the case could be determined quite closely. By holding the humidity very low all of the time, the plants dried out at once, and became

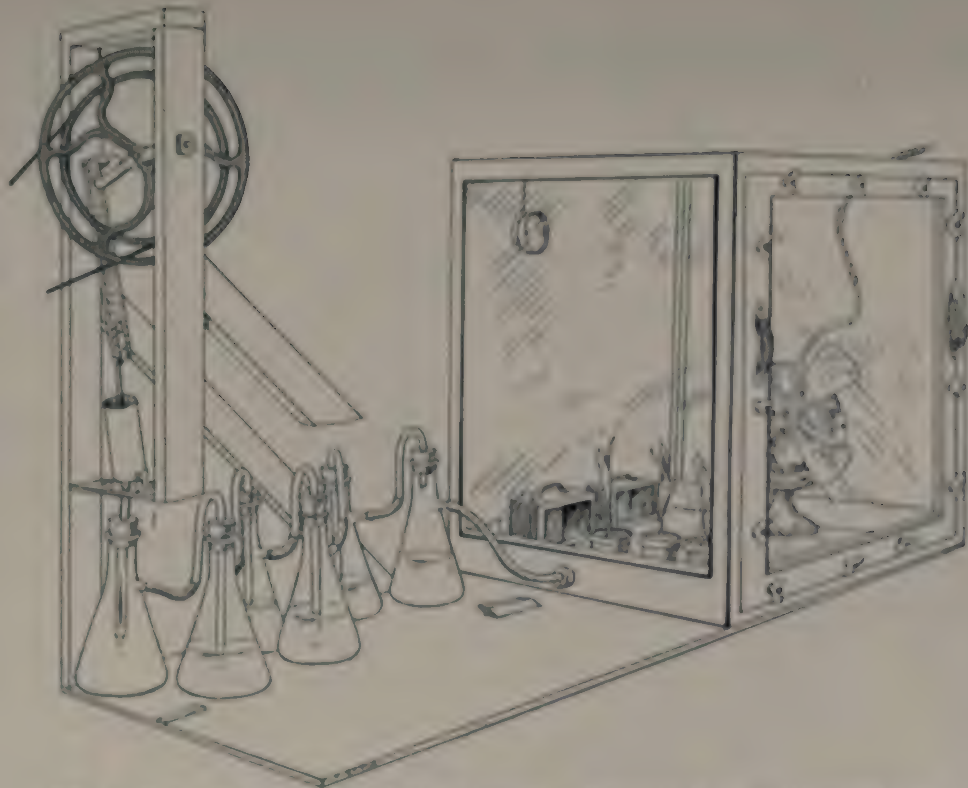

FIG. 1. Plant-case for the control of relative humidity. Description in text. (Illustrated with the aid of the Catherine M. Manes fund.)

practically crisp, as soon as the protoplasm died. There were no temporary recoveries to complicate the determination, as is the case when the humidity relations are fluctuating.

THE DEPARTMENT OF BOTANY,
UNIVERSITY OF MISSOURI,
COLUMBIA, MISSOURI

LOCAL FLORA NOTES — III

BY NORMAN TAYLOR

A goodly number of replies to questions asked in the first two numbers of this series have been already received. The members of the club are so evidently interested that it can be only a matter of short duration until many of the disputed or little known species are fairly well understood, so far as the local range * is concerned. Several letters and post cards containing information on the distribution of certain plants have come in, unaccompanied by specimens. Of the authenticity of these statements there is, for the most part, no question. But without a specimen deposited in the club's herbarium, where it constitutes an indisputable record, the present members of the Torrey Club can scarcely expect to silence the questionings of an incredulous posterity. Members are urged to continue their kindly coöperation so that the work may be pushed as rapidly as possible. Specimens submitted in answer to questions will be put in the club herbarium and full acknowledgment will be made.

The list continues :

COMMELINACEAE

1. *Commelina hirtella* Vahl. The only specimen in our collections is from near Camden, N. J. Judging from the manuals it should be found throughout southern Jersey. Has any one seen it anywhere else in New Jersey except near Camden ?

* The local flora range as prescribed by the Club's preliminary catalog of 1888 is as follows : All the state of Connecticut ; Long Island ; in New York, the counties bordering the Hudson River, up to and including Columbia and Greene, also Sullivan and Delaware counties ; all the state of New Jersey ; and Pike, Wayne, Monroe, Lackawanna, Luzerne, Northampton, Lehigh, Carbon, Bucks, Berks, Schuylkill, Montgomery, Philadelphia, Delaware, and Chester counties in Pennsylvania.

2. *Commelina nudiflora* L. While this is apparently a widely distributed plant the only specimen in the collections is from Inwood, N. Y. City. According to general works it should be found from New Jersey southward, etc. Is it found on Long Island?

PONTEDERIACEAE

1. *Pontederia cordata lancifolia* (Muhl.) Morong. While the common pickerel-weed is exceedingly common everywhere, this lanceolate leaved form comes only from Green Pond, N. J. General works say of it "Ont. to N. J.," etc. Has it ever been found outside of this one pond in New Jersey?

2. *Heteranthera reniformis* R. & P. All the specimens in the collections are from New Jersey and Pennsylvania. The exclusion of this plant from the Hudson valley and Connecticut is obviously untrue but specimens at hand do not show its distribution outside of New Jersey and Pennsylvania.

JUNCACEAE

1. *Juncus gymnocarpus* Coville. Its general distribution is given thus, "In swamps, mountains of Schuylkill and Lebanon counties, Penn." The only specimen in the collections is from the former county. Is the plant localized in the hills near this region or may it be looked for elsewhere?

2. *Juncus Balticus* Willd. So far as the specimens show this plant grows only on Staten Island. With a general range of from Labrador to southern New York, is this delimitation, as shown by our specimens, reasonable?

3. *Juncus Roemerianus* Scheele. Through an early though still current error, the plant is credited to New Jersey. No specimens can be found which come from north of the Carolinas, and as an element in our local flora the plant may be ignored.

4. *Juncus maritimus* Lam. The only station in the New World for this plant is Coney Island, New York City. Years ago it was reported from New Jersey but no specimens are extant. How far from Coney Island has the plant spread, if at all? Has any one specimens from New Jersey? Staten Island?

5. *Juncus trifidus* L. The only specimen is from Sam's Point, Ulster Co., N. Y. This may well be its southerly point of distribution within our range. However, it should grow in Delaware and Greene counties, particularly in the higher mountains.

6. *Juncus dichotomus* Ell. New Jersey seems to be the exclusive possessor of this species, according to the specimens at hand. It is supposed to be found from Maine to Florida, near the coast. Does it grow on Long Island or on the coast of Connecticut? On Staten Island?

7. *Juncus aristulatus* Michx. Our representation of this species is very scanty. Princeton is the only station in New Jersey; Westchester in Pennsylvania, and Sag Harbor on Long Island. It is supposed to grow near the coast from New York to Florida. Any extension of its present apparaently limited distribution is desirable.

8. *Juncus nodosus* L. With a general range of from Nova Scotia to Virginia, our specimens are wrongly limiting this plant to a small area from Goshen, Conn., to Lake Grinell, Sussex Co., N. J. The plant is doubtless more widely distributed in our area than this, but how much more?

9. *Juncus caesariensis* Coville. Griffiths and Landisville, N. J., are the only stations represented in herbaria. Where else in Jersey is the plant found? It is supposed to grow in "Sandy Swamps of S. N. J."

10. *Juncus canadensis subcaudatus* Engel. This variety is represented by a single specimen from Red Bank, N. J. Its general distribution is from Rhode Island to Pennsylvania and Georgia. Where else, besides the Jersey station, does the plant grow?

11. *Juncoides nemorosum* (Poll.) Kuntze. So far as known this plant seems to be locally naturalized at Riverdale, New York City. Has any one a record of its being found elsewhere?

12. *Juncoides parviflorum* (Ehrh.) Coville. There are no specimens of this from the range. Judging from its general distribution it should be found on the higher mountains of the Catskills and perhaps in the Pocono region. Has it been seen in either of these localities?

Melanthaceae

1. *Tofieldia racemosa* (Walt.) B. S. P. The specimens in the collection all come from southern Jersey. How far north in the pine barrens may the plant be looked for?

2. *Helonias bullata* L. With the single exception of one specimen from near Philadelphia, Pennsylvania is apparently lacking this species. How many of the counties in eastern Pennsylvania may be expected to contain the plant?

3. *Chrosperma muscaetoxicum* (Walt.) Kuntze. The general distribution of this plant is stated to be Long Island to eastern Pennsylvania, etc. Valley Stream, L. I., is the only station so far known from the island. Do Long Island botanists know of its being anywhere else? The plant's Jersey and Pennsylvania distribution is about what general works credit it to be.

4. *Oceanorus leimanthoides* (A. Gray) Small. (*Zygadenus* of the manuals.) So far as its distribution in New Jersey is concerned the plant is well understood. One locality on Long Island, Rockville Center, has recently been discovered by Mr. Bicknell. Other stations are reported from Long Island but no specimens are in the collections representing these. What is its present distribution on the island?

5. *Melanthium virginicum* L. The plant's distribution around New York City is fairly well represented in herbaria. There are no specimens from the Hudson Valley above Yonkers and none from Connecticut. With a general distribution of from Rhode Island to New York, Florida, etc., the localization of the plant around the city is undoubtedly false.

6. *Uvularia grandiflora* J. E. Smith. This plant may confidently be expected to turn up in the higher Catskills although up to now no record is extant. The stations nearest to our range are Troy, N. Y., and Susquehanna Co., Pa. Has any one ever seen it within the range?

New York Botanical Garden

THE EUCALYPTUS TREES OF CALIFORNIA

By Jean Broadhurst

While the palms of California are at first the most novel feature of the landscape to the tourists from eastern or northeastern United States, they, because of our familiarity with that type of vegetation through pictures and the struggling specimens seen in conservatories and even in parlors and roof gardens, soon become an almost unnoted part of the general impression that means California.

The above is not true of the eucalyptus trees or "eucalypts" as they are beginning to be called — and quite sensibly, too. For those who object to the English plural of cactus would refuse to try similar five-syllabled plural for eucalyptus ; and even the advocates of anglicized spelling must be relieved to learn the simpler three syllabled "eucalypts" for the plural form. The eucalypts, with the erratic and unsymmetrical branching of the tall and rapidly-growing younger trees, are as striking as young ginkgo trees, though they, too, become more symmetrical as they grow older. Irregular rows of these characteristic trees border the lanes, streets, and fields ; young, blue-gray groves of them cover mistily the distant slopes. Examining them more closely the usual tourist comes away with a hazy idea that the eucalyptus tree is "very easy to tell at a distance, and very difficult to identify when seen close by. The bark scales off, like the buttonwood or sycamore, or in strips like a juniper, or it doesn't come off at all. The leaves are either blue-gray, or dull green ; or both kinds may be found on one tree. The leaves are broad, rounded at the tip, and sessile like the boneset ; or else they are slender, falcate, and long petioled, in which case they have a wholly different position from the broader spreading leaves of the same tree, hanging down in a limp loose-jointed way like the heavy hands of an uncomfortable raw-boned youth. The eucalypts bear curious conical flower bases or fruits which are very aromatic, or they never bear any fruit at all." And so the contradictions continue until one wonders if there is anything the eucalyptus trees may or may not have and yet be eucalyp-

tus trees. Then, suddenly, some of the eucalyptus "literature" that floods the state comes that way, and the dazed traveler reads that "there are now growing in California over sixty species of *Eucalyptus*", and he is at once illuminated and satisfied until his next walk abroad; then the differences and likenesses become amazingly confused, and he sees that no tree is like any other tree, and yet every tree is like every other tree. Then, if he be a philosophical traveler, his satisfaction becomes merged into relief that *he* doesn't have to demonstrate the existence of one hundred and fifty possible species, and that, anyhow, he isn't going to stay long enough in California for people who guess his botanical taint to find out his weakness — at least if he tactfully leads them to discuss the merits and value of the eucalyptus and so away from the dangerous quicksand of eucalyptus teleology, which is just what this article proposes to do. For it is enough to have sixty or more species of any one family suddenly thrust upon the unsuspecting traveler, without having among them, species in which the "leaf" is so varied that a single tree may show leaves that are alternate or opposite, spreading or declined, and broadly elliptical or narrow and unsymmetrical.

The eucalyptus tree commonly called the "gum" tree was introduced into California for ornamental purposes in 1856. It is a native of Australia and the adjacent islands, and belongs to the family Myrtaceae, numbering over one hundred and fifty distinct species. The genus was first discovered by the French botanist, L'Heritier, in 1788, and was named by him *Eucalyptus*, meaning "well concealed," the name being prompted by the closely-covered and well-concealed flower buds. Baron von Mueller, a recognized authority on eucalyptus, suggested the general term "eucalypts" which is now in common use. In 1870 Elwood Cooper, of Santa Barbara, commenced large planting operations to test many species.

The Department of Agriculture (Bulletin No. 35 of the Bureau of Forestry) issued an extensive series of photographic plates as aids in identifying the species. Since then the state forester's office has issued a very comprehensive bulletin covering the trees

now growing in California; and the State Agricultural Experiment Station has recently issued a detailed bulletin concerning the many species growing in the state.

FIGURE 1. A good stand of *E. tereticornis* trees, fourteen months old.*

The common species in California are *Eucalyptus botryoides*, bastard mahogany; *E. citriodora*, lemon gum; *E. corynocalyx*,

* Plate loaned by the Eucalyptus Timber Company, Los Angeles, California; the same company also furnished numerous pamphlets from which were gathered most of the data in this article.

sugar gum; *E. crebra*, narrow leafed ironbark or gray gum; *E. diversicolor*, Karri; *E. globulus*, blue gum; *E. pilularis*, blackbutt; *E. punctata*, leather jacket; *E. resinifera*, mahogany, forest mahogany, or red mahogany; *E. rostrata*, Murray red gum, red gum, mahogany; *E. tereticornis*, gray gum, Queensland blue gum, red gum, flooded gum, or bastard box; *E. microcorys*, tallowwood; and *E. viminalis*, manna gum.

Two years ago the term "commercial eucalyptus" was written in quotation marks; now it is a common term, and thousands of acres have been devoted to seedling nurseries, and to timber production.

The commercial importance of the eucalyptus is implied in the title of an article in a recent magazine* where it is ranked with the hickory. All the species produce hardwood, varying quite widely, however, in hardness. Originally the trees were regarded as suitable for forest cover, for windbreaks, for hedgerows, and for fuel. Now, there is no possible use to which wood may be put which is not claimed for one or more of the eucalypts which may be grown in a region where the wood supply has always been a distressing problem, and in a state where the beams used in the old mission churches were, it is said, carried hundreds of miles. The uses claimed by enthusiastic growers include fuel, fenceposts, corduroy roads (sixty years of service), paving blocks, railroad ties, bridge and mine timbers, telegraph and telephone poles, shipbuilding,† cooperage, furniture, house finishings and cabinet making. Handsomely finished rooms with highly polished "mahogany" furniture form part of the advertising methods of the larger eucalyptus and state-promotion organizations.

Extracting the antiseptic oil from the leaves and twigs is also profitable; that and the keeping of bees where they can feed

* Hickory's Younger Brother, by F. D. Cornell in the Sunset Magazine, March, 1909.

† "The wood is very dense, hard, close grained, and tough, and will bear a tremendous load or strain. Some species produce a wood so dense as to be practically impervious to water, and they are therefore almost proof against rot or decay, in water or out of it, in the earth or out of it; and, owing to the oils and acids in the wood some species are proof against teredos, termites, insects, and borers."

on the eucalyptus blossoms, adds materially to the income; but these are admitted to be secondary considerations. The shade value is not inconsiderable, and the forest cover it affords must render an enormous service to the whole Southwest. These last considerations do not appeal to the farmers and wood-growers any more forcibly than in the rest of the country, unfortunately; and the "literature", therefore, emphasizes the high financial profits to be gained within a few years, through the incredibly rapid growth of many of the species. Pamphlets published by the state forestry department and by private commercial corporations include the following statements: 1. "*E. globulus* trees 175 feet in height and 5 or 6 feet in diameter have been produced here (California) in from twenty-four to thirty years. The single quality, rapidity of growth, entitles the eucalypts to serious consideration, for no other species can attain like dimensions in five times this period." 2. "The average growth of a ten-year-old eucalyptus, based on exhaustive measurements, is given as eleven inches in diameter and ninety-two feet in height." 3. "Under favorable conditions trees in seedling plantations have reached a maximum development of 5 inches in diameter and 67 feet in height in four years. This represents an average of 17 feet height growth per year, though a growth of 10 to 15 feet in height yearly is the general average." 4. "In the height of the first growing season seedlings have frequently been observed to make an average height growth of 6 inches a day. The most rapid seedling growth noted was made by a tree which in nine years reached a height of 125 feet and a diameter of 36 inches." 5. The actual size of a tree from the forests of the Eucalyptus Timber Corporation, which was planted April 20, 1908, and dug up August 5, 1909, was "13½ feet in height, measured on the bole, and 13¾ inches in circumference at the base; the main tap-root had penetrated to an actual depth of 16½ feet below the surface of the soil." 6. "*E. globulus* eight to ten years old, if cut to the ground, will send up shoots that will reach a height of 75 or 100 feet, in from 6 to 8 years. The cutting may be repeated every few years for an indefinite period."

Californians are fond of quoting comparisons like the following

which is based upon tree measurements made in Kentucky by Mr. John R. Atkinson:

Pine oak	will grow	to	12	in.	diam.	in 40	yrs
Black locust	"	"	12	"	"	40	"
Tulip	"	"	12	"	"	50	"
Black oak	"	"	12	"	"	50	"
Black walnut	"	"	12	"	"	56	"
Texas red oak	"	"	12	"	"	58	"
Sweet gum	"	"	12	"	"	62	"
Ash	"	"	12	"	"	72	"
Hickories	"	"	12	"	"	90	"
White oak	"	"	12	"	"	100	"
EUCALYPTUS	"	"	12	"	"	10	"

The above figures, which are probably somewhat biased, suggest however that in a short period the California wood famine will cease to be an important problem. It will not help materially the greater part of the United States, of course, as the eucalypts thrive best where the temperature does not fall below 24°.

Except that the entire genus is rather intolerant of cold, and therefore is confined to those sections of the globe where favorable climatic conditions obtain, there seems to be no limit to the fitness of the eucalypts to any given soil or climatic conditions. Some thrive in swamp land; others in coastal situations or on high plateaus, hillsides, rocky lands, and even deserts. While the trees produce seeds freely, the seedlings do not "volunteer"; and the production of seedlings for commercial purposes is confined to regularly established nurseries devoted to that purpose. The trees reproduce, however, very rapidly from shoots springing from the stump of felled trees, and the second growth is much more rapid and as valuable as the first growth.

Facts like the above indicate not only large financial profits in the near future (seven to ten years) with very little outlay, for these trees need very little care after the first two years; but they also justify the optimistic claim that the "gap which is yawning between the supply which exists and the supply which will have to be provided" can be filled effectively — at least in the Southwest — if we but recognize the possible uses of the eucalypts, and that prompt action in planting quantities of the more desirable eucalypts will postpone indefinitely the "lean years" close upon us.

SHORTER NOTES

The Andropogon-Viola Uromyces. — A note has previously been published in Torreya * on the probable identity of an *Aecidium* on *Viola* and of the *Uromyces andropogonis* Tracy on *Andropogon virginicus* L. This conclusion was reached after repeated observations and inoculations had been made in the field. Proof of their identity was obtained during the spring of 1909 by inoculating violet leaves, under control conditions, with teleutospores of the *Uromyces*. Seven days after the inoculations were made, spermogonia began to show on the violet leaves, followed by mature aecidia on the fifteenth day.

In reply to a letter to Professor J. C. Arthur, concerning the nomenclature of the rust, he states that "Tracy published his *Uromyces andropogonis* in 1893, while *Caeoma* (*Aecidium*) *pedatatum* Schw. dates from 1832." This being the case, the name of the rust becomes **Uromyces pedatatus** (Schw.) n. comb.

John L. Sheldon

West Virginia University,
Morgantown, West Virginia

A new Ponthieva from the Bahamas: **Ponthieva Brittonæ** sp. nov.

Aff. *P. racemosæ* (Walt.) Mohr, *sed in floribus minor et in racemo angustior. Radices* elongatæ, flexuosæ, villosæ. *Folia* rosulata, oblongi-lanceolata vel oblanceolata, 4–10 cm. longa, 1.5–3.5 cm. lata, acuta ad basim in petiolum sulcatum 1–2.5 cm. longum contracta. *Scapus* teres, gracilis 26.5–37 cm. altus. *Bracteæ* oblongæ, acuminatæ, acutæ. *Inflorescentia* racemosa. *Racemus*, floribus 20–35, 1–1.8 dm. longus, circa 2 cm. in diametro, laxiflorus, pubescens. *Bracteæ* inflorescentiæ oblongæ, acuminatæ, valde acutæ, circa 5 mm. longæ. *Pedicellus* cum ovario 7–9 mm. longus.† *Sepala lateralia* ovato-lanceolata, 4 mm. longa, 2 mm. lata. *Sepalum dorsale* oblongi-lanceolatum, obtusum. *Petala* lanceolata pauci-nervia, obtusa, 4.5 mm. longa. *Labellum* sub-saccatum, 4.5 mm. longum, 3-lobatum; *lobi laterales* rotundati; *lobus medius* oblongus, obtusus, 1 mm. longus, 0.5 mm. latus.

* Torreya 9: 54. 1909.

† This measurement applies to open flowers.

Ponthieva Brittonæ is very closely allied to *P. racemosa* from which it differs chiefly in its smaller flowers, slenderer raceme, and in its differently formed petals.

BAHAMAS, NEW PROVIDENCE: Maidenhead Coppice, February 7, 1905, *E. G. Britton* (no. 3297). *Type* in Hb. New York Botanical Garden; *Co-type* in Hb. Ames.

OAKES AMES

ANSWERS TO THE WISCONSIN RIDDLE. — In TORREYA for February, 1910, Mr. S. B. Parish asks for information as to certain plants referred to by Father Dablon in the Jesuit Relations as occurring on the Fox river in Wisconsin. Of course I cannot answer his query definitely but I suggest that the "kind of lime resembling that of France but having no bitter taste, not even in its rind" and which "slightly resembles the fern" may be the fruit of *Podophyllum peltatum* L. The shape and color of the fruit might suggest the lime, and the plant a remote resemblance to the brake. The identity of the second plant is more doubtful as there are so many "snake-roots", but *Polygala Senega* L., occurred to me in that connection.

J. J. DAVIS

RACINE, WISCONSIN

Dr. Roland M. Harper, referring to the "lime" mentioned in the February TORREYA says: "I read Mr. Parish's 'Wisconsin riddle' with considerable interest, for there are a good many analogous cases in the southeastern states in the writings of Bartram and other early travelers. Although I have never been within several hundred miles of Wisconsin, I think I can suggest an answer to the first part of the riddle. There are said to be some species of *Astragalus* with fleshy (perhaps edible?) fruit out that way, and as the leaves in that genus are pinnate a comparison with a fern would not be very far-fetched." With reference to *Podophyllum* Dr. Harper says: "*Podophyllum* would be a pretty good guess for that Wisconsin plant, but for the fact that in the East it is a typical shade plant, and I could hardly think of it as growing on a prairie. But of course it may behave differently in the West, for all I know."

PROCEEDINGS OF THE CLUB

February 8, 1910

This meeting was held at the American Museum of Natural History. Dr. William Mansfield occupied the chair. Seventeen people were present.

The minutes of the last meeting, January 26, were read and approved.

The special committee for securing funds for the Tuesday evening lectures made a report.

Resignations were read and accepted from Miss Nellie P. Hewins and Mrs. Jane Condit Robison. The scientific paper of the evening was by Dr. P. A. Rydberg on "Flora of the Arctic Regions."

It was well illustrated by numerous mounted specimens collected on the later Peary expeditions.

The following abstract has been prepared by Dr. Rydberg:

"The two collections exhibited were made by Dr. Goodsell in 1908–9 and by Dr. Wolf in 1905–6, partly on Greenland, partly on Ellesmere Land, and partly in Labrador. As the last-mentioned locality belongs to the subarctic rather than the arctic regions, the plants from there were merely shown, but no description of the flora was given. It contained one new species of umbellifers of which Dr. Rose of the U. S. National Museum has furnished a description.

"A general description of Greenland and Ellesmere Land was given. Greenland is an immense ice-covered plateau, rising on the east side to 10,000–11,000 feet and on the west side to 5,400 feet. Only a narrow strip along the coast and the small islands outside become bare in the summer, and here the meager flora is found. Ellesmere Land is lower. There is no continuous inland ice, although smaller icefields, snow-covered mountains, and glaciers are found.

"In accounts of the flora of Greenland and Ellesmere Land, one seldom finds any references to the altitude at which certain plants grow. There seems to be no difference between the flora at sea-level and that at an altitude of two thousand feet; the luxuriance

or meagerness of the flora depends wholly on soil and water-supply.

"A comparison was made between the flora of these regions and of the Scandinavian peninsula at the same distance from the pole. At a latitude at which the hardwood forests grow in Sweden, there is found in Greenland only one tree, a small birch, *Betula odorata tortuosa;* and dwarf undershrubs are the only representatives of the woody flora at the same latitude as that in which we find pine and spruce forests in Scandinavia.

"At the Danish colonies, all south of Lat. 72°, no grains or fruit can be grown, only a few vegetables, as green cabbage, lettuce, turnips, and parsley. None of them grow as far north as Etah. The only native plants that can be used as food at this latitude are the following: the crowberry, *Empetrum nigrum*, and a blueberry, *Vaccinium uliginosum microphyllum*, of which the fruit is eaten; a stone-crop, *Rhodiola rosea*, and the mountain sorrel, *Oxyria digyna*, of which rootstock and leaves are used; and two scurvy-grasses, *Cochlearia groenlandica* and *C. fenestrata*, the foliage of which is used for food and as a remedy against scurvy.

"The woody plants of Greenland, north of Lat. 72°, consist of small undershrubs: a dwarf birch, *Betula flabellifolia;* three willows, *Salix groenlandica*, *S. anglorum*, and *S. herbacea;* the crowberry and blueberry, mentioned above; *Cassiope tetragona;* and *Diapensia lapponica*. A few degrees south of Etah the following are added: *Phyllodoce coerulea*, *Andromeda polifolia*, *Cassiope hypnoides*, *Chamaecistus procumbens*, *Rhododendron lapponicum*, and *Ledum decumbens*, all of the heath family. The woody vegetation of Ellesmere Land consists of two willows, the small blueberry, the crowberry, *Diapensia lapponica*, and *Cassiope tetragona*.

"The flora of northern Greenland (north of Lat. 72°) and Ellesmere Land numbers about 150 species of phanerogams. Of these not more than 100 are found as far north as Etah. Three fifths of the plants are circumpolar, more than one fifth are common to the region and Arctic America, and the remaining fifth or less are endemic plants or else plants of European origin, that is, also common to Iceland or Spitzbergen.

"Outside of the grasses, sedges, and rushes (together about 40 species), there are no monocotyledons in Ellesmere Land and only *Tofieldia palustris* in northern Greenland. The rest are dicotyledons, representing 26 families.

"Nearly all the plants are perennials. The herbs are mostly densely tufted plants with thick rootstocks; these grow in the gravel-beds and among rocks. The plants of the moister and richer soils have usually more slender and creeping rootstocks. The only annuals, as far as the speaker knew, were the two species of scurvy-grass.

"The collections made by Dr. Goodsell and by Dr. Wolf numbered together 60 species. Some of the species were duplicated by specimens from different localities. A few other Greenland and Ellesmere Land plants, not in these collections, were also exhibited in order to give a fairer idea of the flora of the region. Some species were represented also by specimens collected in the Rocky Mountains, in northern Europe, or northeastern America, to show how the same plants grow under more favorable conditions."

The meeting adjourned at 10.25 P. M.

JEAN BROADHURST,
Secretary pro tem.

FEBRUARY 23, 1910

This meeting was held in the morphological laboratory of the Museum of the New York Botanical Garden at 3:30 P. M. Seventeen persons were present. Dr. William A. Murrill presided.

Mr. Sereno Stetson, 507 West 113th Street, New York City, was nominated for membership.

The first part of the announced program consisted of an "Informal Report on a Collecting Expedition to Panama" by Dr. Marshall A. Howe. The period between December 5, 1909, and January 12, 1910, was devoted to botanical explorations in the Canal Zone and vicinity. The special object of the visit was to collect and study the marine algae of the region, but the marine

algae proving rather unexpectedly infrequent, especially on the Pacific shores of the Isthmus, there was considerable opportunity for turning attention to the land flora, particularly the fungi, Hepaticæ, Musci, etc., and for securing photographs of general botanical interest. The speaker exhibited many specimens and also numerous photographs, illustrating the floral aspects of the region and details of certain selected plants. A marine flora, in the more popular sense of the word, seems to be almost non-existent in the Bay of Panama, or at least in the parts of it that were examined. There are, however, a few closely incrusting species of such genera as *Ralfsia* and *Hildenbrandtia* and of the families Squamariaceae and Corallinaceae, and there are repretatives of the Cyanophyceae and of such genera as *Enteromorpha*, *Chaetomorpha*, *Bostrychia*, *Caloglossa*, *Catenella*, *Lophosiphonia*, *Herposiphonia*, and a few other rather small and inconspicuous kinds. Not a fragment of an alga or of any marine seed-plant was found washed ashore at any part of the Bay of Panama that was examined. The cause of the paucity of marine plant life in this region is not wholly obvious, but is probably to be found in the combination of wide-ranging tides with tropical conditions as to light and heat. The scorching effect of the direct rays of the tropical sun is of course unfavorable to any luxuriant development of the algae between the tide-lines, and at and below the low-water mark the fluctuations in water-pressure and light-intensity seem here in some way to act unfavorably upon plant-life. At least, on the Atlantic or Caribbean side of the Isthmus, only fifty miles to the northward, where the conditions are apparently similar except that the tides are much lighter, there is a fairly well-developed and diversified marine flora, in striking contrast to that of the Bay of Panama. On the Pacific side, in the Bay of Panama, the tides have a maximum vertical range of from ten to nineteen feet; at Colon, on the Atlantic or Caribbean side, the range is commonly less than two feet. About three weeks were devoted to making collections at Colon and vicinity, with more satisfactory results so far as the algae were concerned. A more detailed account of the expedition appears in the *Journal of the New York Botanical Garden* for February.

The second paper on the program was by Dr. W. A. Murrill and was entitled "Collecting in Mexico." This paper, an abstract of which follows, was illustrated by numerous photographs taken by the speaker.

"The special object of the expedition to southern Mexico was to secure specimens, descriptive notes, and colored drawings of the fleshy and woody fungi. Collections were made in eight different localities, 3,300 specimens of fungi being obtained, 120 of which are represented by colored drawings.

"The first stop was made at Jalapa, at an elevation of 5,000 feet, in the moist region of the eastern slope. About a week was spent there, searching the dense virgin forests for fungi. A number of medicinal plants, such as jalap and sarsaparilla, were formerly exported from these forests in large quantities. Ferns, mosses, liverworts, and lichens are abundant in the woods and on the lava walls along the roads and in the fields.

"The next principal stop was at Cuernavaca, where we collected in the barrancas and gardens from the village of San Antonio to Chapultepec. An excursion was also made on horseback to the Tepeite Valley, on the southern side of Ajusco at an elevation of 7,000 feet. This region was moist and very rich in fungi, as well as in mosses and epiphytes.

"A short stop was made in Mexico City in order to visit the famous tree of "*la noche triste*" and the magnificent grove of ahuehuetes (*Taxodium mucronatum*) adjoining the castle of Chapultepec.

"From Mexico City, we went direct to Colima, on the western coast, a journey of 24 hours by rail. We found the climate there too dry for fleshy fungi, but obtained a number of woody species. Specimens of the interesting *candelilla*, or wax-plant, which grows in the barrancas about Colima, were obtained from Monsieur A. Le Harivel. The wax obtained from this plant is coming into use in New York City for phonographic records.

"The only considerable journey made from Colima as a base was to Tecoman and the west side of the valley of the Armeria River, where the elevation is only one or two hundred feet above sea-level. The dense tropical jungle along this river was examined

for several miles and many interesting specimens obtained. On the return journey, the buried city of San Juan Teotihuacan, thirty-two miles northeast of Mexico City, was visited, together with the maguey plantations and cactus thickets so abundant in the vicinity.

"Orizaba, at 4,000 feet elevation among the mountains of the eastern slope, was our next collecting base, and here the ravines and coffee plantations yielded many interesting specimens. The weather, however, remained a little too cool for some forms of fungi, and it was decided to seek lower elevations while the rains continued. Accordingly, we went to Cordoba and from there south to Motzorongo, 800 feet above sea-level, where the conditions were ideal. Another trip was taken to Xuchiles, between Motzorongo and Cordoba, and collections were made in the coffee and banana plantations of the Rio Blanco. This whole region about Cordorba is of great botanical interest and is easily accessible by railways running in four different directions.

"A full descriptive account of this expedition, illustrated with original photographs, will be published in the *Journal of the New York Botanical Garden* for March."

Adjournment followed.

MARSHALL A. HOWE,
Secretary pro tem.

OF INTEREST TO TEACHERS

SCIENCE TEACHING

The address of Professor John Dewey, before Section L of the American Association for the Advancement of Science at Boston is reprinted in *Science* for January 28, 1910. The gap between "scientific specialists and those who are interested in science on account of its significance in life" is mentioned, and attention is called to the fact that those interested in "securing for the sciences the place that belongs to them in education feel a certain amount of disappointment at the results hitherto attained." The one great cause suggested for this failure is thought to be that science is "taught too much as an accumulation of ready-made

material with which students are to be made familiar, and not enough as a method of thinking, an attitude of mind, after the pattern of which mental habits are to be transformed." Two of the most serious difficulties that confront the educator are the number of sciences and the "indefinite bulk of the material in each, making it seem as if the educational availability of science were breaking down because of its own sheer mass." In the secondary school the rival claims of (1) a little of a great many sciences, (2) a good deal of one, (3) a combination of one exact and one biological science, and (4) full option of one to three sciences from the six or more given have not helped in the solution of the main problem. Attention is called to the fact that laboratory methods do not of themselves influence the pupil or student; that one's mental attitude is not necessarily changed because he handles certain tools and materials. They are part of the ritual — and too often only that. Dr. Dewey further states that "the future of our civilization depends upon the widening spread and deepening hold of the scientific habit of mind; and that the problem of problems is therefore to discover how to mature and make effective this scientific habit."

German foresters are importing larch seeds from Montana and white pine seedings from Ontario.

Evaporation experiments made with cotton or wax spread over evaporating surfaces of saturated blotting paper (*Science*, March 18) have led Professor Wiegand of Wellesley to conclude that plants may "make use of waxy coverings when transpiration is to be retarded at all times, and hairy coverings when it is to be retarded only if exposed to strong dry winds and sunshine."

The United States government spends about two cents an acre on the national forests. Germany and Switzerland, it is said, spend one to two dollars an acre. It would seem, therefore, that the appropriations for the coming year should be increased, instead of lessened; and increased not only as a gross sum because of

the larger area to be cared for this year, but increased sufficiently to give a higher sum per acre

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In the February *Journal of the New York Botanical Garden* attention is called to the danger to buildings from the dry rot (*Merulius lacrymans*). It has not "been recognized in this country as it has in Europe and builders have been allowed to use unseasoned wood to a large extent. A recent investigation in New York City by Professor I. H. Woolson, of Columbia University, brought to light an astonishing condition of affairs in a great number of wooden buildings, which may collapse as did the Gledhill factory unless speedily repaired."

A recent paper by Haven Metcalf calls attention to the fact that the chestnut disease (*Diaporthe parasitica*) "ordinarily gains entrance through wounds, of which the commonest are the tunnels produced by various bark borers. Such wounds as these are always moist, and hence favorable to the growth of any spore." This bark disease shows "no definite relation to the points of the compass, as the location of lesions is determined by the position of the wounds through which the fungus gained entrance. In small, smooth-barked trees, death may be prevented by a system of inspection and cutting out of diseased tissue, somewhat similar to that practiced with pear-blight. On large, thick-barked trees this is impracticable, as it is impossible to distinguish disease lesions under the thick bark."

NEWS ITEMS

Dr. G. Haberlandt of Graz has been appointed to the chair of botany at the University of Berlin.

Professor Alexander Agassiz, the naturalist, died of heart disease, March 27, while returning to America on the *Adriatic*.

Mrs. Eliza Caroline Bommer, widow of the botanist J. E. Bommer, died January last in Brussels. Mrs. Bommer was known chiefly for her work with ferns.

A new American institute of research, the Jewish Agricultural Experiment Station, has just been incorporated in New York. The station is to be located at the foot of Mt. Carmel, and, under the directorship of Mr. Aaron Aaronsohn, will endeavor "to put the Jewish colonists and farmers of Palestine and the neighboring colonies in a position to carry on agriculture" in a progressive manner. Laboratory privileges will be given properly accredited visitors.

Brooklyn is to have a botanic garden and arboretum. Thirty acres of grounds are now being laid out by Frederick L. Olmstead, the landscape artist, back of the Museum of the Brooklyn Institute of Arts and Sciences on Eastern Parkway. A recent endowment of $50,000 through unnamed friends of the Brooklyn Institute has made possible the establishment of the Brooklyn Botanic Garden, for the construction of which the city is pledged for $100,000. Professor C. Stuart Gager, head of the department of botany of the University of Missouri, has accepted the directorship of the Garden. The plans include large laboratories, affording opportunity for study to the pupils of the public and private schools, as well as graduate students. Professor Gager's professional experience in normal and high schools, and in several colleges and universities, including some years at the New York Botanical Garden, fit him admirably for the position of Director of the new Brooklyn Botanic Garden, which promises to contribute most helpfully to the problems of the teaching of botany.

TORREYA

May, 1910

Vol. 10 No. 5

VARIATION AMONG NON-LOBED SASSAFRAS LEAVES*

BY EDWIN W. HUMPHREYS

Sassafras is for various reasons one of the most interesting of our native trees. One of the interesting features, and the one that has probably attracted the most attention to the tree, is its variously shaped leaves. That each of these leaf forms in turn shows considerable variation in its characters is apparently not so definitely known, and the limits of such variation are still less known. Yet a study of these differences is of much interest, particularly from the viewpoint of paleobotany; for most of the identifications of fossil plants are based on leaves only and naturally the limits of leaf variation are of more importance to the paleobotanist than they are to the botanist who has, in addition to the leaves, other characters on which to base his identifications. It was for the purpose of determining, in a measure, how greatly the non-lobed sassafras leaves varied among themselves that the present study, based on leaves collected at random in Bronx and Pelham Bay Parks, New York, and on the Palisades of New Jersey, was made.

The most obvious variation is in the proportion of length to breadth. At one extreme is a leaf in which the length is only one and two fifths times the breadth, making an almost circular leaf; while at the other is a leaf whose length is three and one half times the breadth, producing a very long narrow leaf. By dividing the leaves into groups based on the relation between breadth and length, the following curve was prepared (FIG. 1). It should be stated that all the curves given here are based on the same five hundred leaves. The figures along the base line

* Illustrated with the aid of the Catherine McManes fund.

[No. 4, Vol. 10, of TORREYA, comprising pp. 77–100, was issued April 26, 1910.]

indicate the ratio between breadth and length adopted for each group, while the height of the curve is determined by the number of individual leaves in that group. It appears, from the curve, that the normal or common type of leaf is that which is about twice as long as it is broad. The progression from very

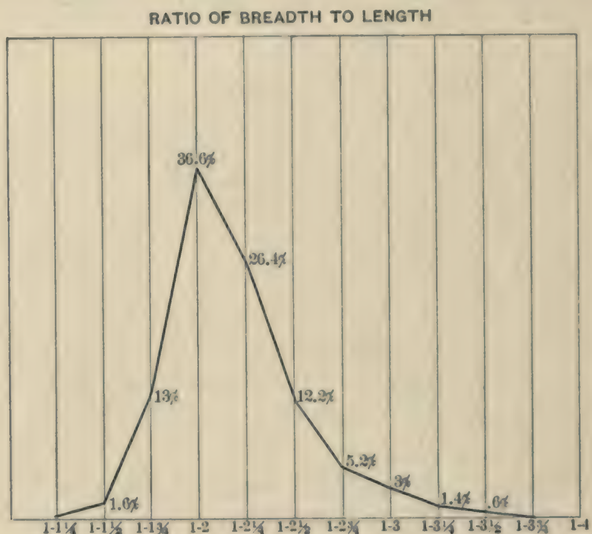


FIGURE 1.

broad leaves to the common form is very abrupt, while that toward the long narrow forms, though still abrupt, is somewhat gentler, tending to show that variants toward the long narrow types are more common, at least among the leaves measured, than are those toward the broader forms.

The shape of a leaf depends chiefly upon the relationship existing between its length and breadth, and upon the position of the broadest part of the blade. Therefore the curve expressing this relationship is to a certain extent prophetic as to what the predominant shape will be. It indicates that the ovate, obovate, oval, and elliptical leaves are likely to be in the majority. Which of these four forms will, however, predominate depends upon the position of the widest part of the leaf. The accuracy of this forecast is shown by the curve (FIG. 2). It

shows that the greater number of leaves are of the shapes mentioned. And, since the widest part is for the most part near the middle, the dominant shape is oval.

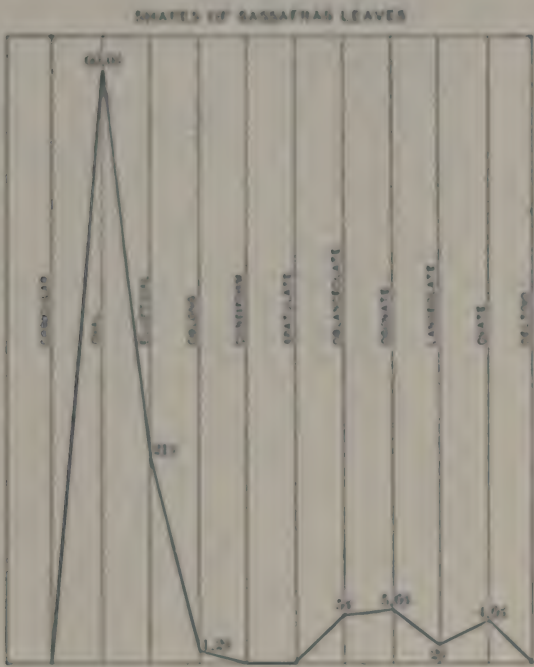


FIGURE 2.

In regard to the form of the tip there is also much variation. As most of the leaves are oval, obtuse tips might be expected to prevail. Though the curve (FIG. 3) shows that this is true, yet a surprisingly large number of other forms are shown. Some of these, for instance the emarginate, may possibly be due to wounding, but that cause can hardly be advanced for all of the variants.

On the condition of the base, sassafras leaves may be divided into two large classes. The first of these includes those leaves in which the blade begins at opposite points on the petiole; the second those in which the blade starts at points that are not opposite, one side beginning at a point either higher or lower than

the other. Of the leaves here studied two hundred and seventy-six, or 55.2 per cent. were of class one, while two hundred and twenty-four, or 44.8 per cent. belonged to class two. Thus the opposite type is apparently the more common.

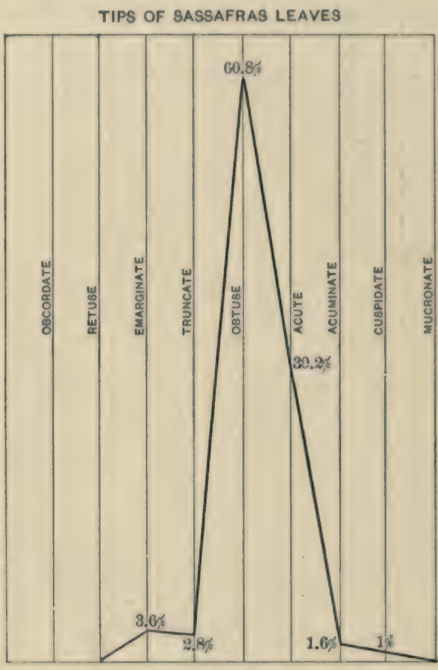


FIGURE 3.

According to the outline of the base, the leaves were divided into four classes. The first of these (FIG. 4) may be called the acute type. The second (FIG. 5) is wedge-shaped, while the third (FIG. 6) is the rounded type. The fourth class consists of mixed types. For example one side of the base of the blade may be wedge-shaped and the other may be rounded, and so on through the various possible combinations. A curve (FIG. 7) based upon these four classes shows at a glance that the acute type (FIG. 4) leads all the others.

An attempt may now be made to formulate what may be regarded as the chief characters of the most common sassafras leaves. The study just completed shows that such a leaf is

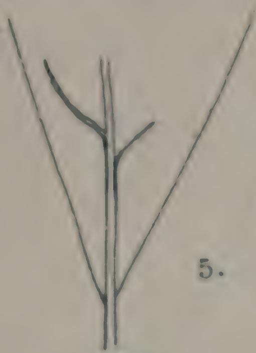
about twice as long as broad, oval in outline, with an obtuse tip, the base of the blade acute and commencing at opposite points on the petiole.

There remains now to be considered the characters of the venation. In all sassafras leaves, the midvein extends from the base as a petiole. In some bud leaves the parenchyma of the blade continues as a wing-like appendage along each side of the midvein to the point of attachment. As the leaves become older this appendage is not found, and the petiole is channeled.

Upward the midvein passes to the tip of the leaf, sometimes forming a short, sharp projection, sometimes a cusp. At times, the parenchyma extends beyond the end of the midvein, forming

4.

FIGURE 4.
Acute type of base.



5.

FIGURE 5.
Wedge type of base.

6.

FIGURE 6.
Rounded type of base.

an emarginate tip. This is probably due to an arrestation of the growth of the midvein, while the parenchyma on either side continues to grow.

From the midvein a number of secondaries are given off. As these soon curve upward and loop into the next succeeding vein, the nervation may be described as pinnate-camptodrome. Two large secondaries always branch off from the midvein near its base. The disposition of these is not the same in all leaves. Sometimes they are opposite, while at other times they are not. Of the five hundred leaves examined 18.8 per cent. were opposite and the remaining 81.2 per cent. were not. It may be remembered in this connection that the majority of the bases of the leaf

margin were opposite. From the above it may be inferred that if the position of these first, and by far the largest secondaries, affected the condition of the base, as to its being opposite or not, the greater number of leaves would not have had opposite bases, but this in the leaves examined is not so. Hence it would appear that the position of the first secondaries does not affect the base.

The secondaries arise at different angles in different leaves. The largest angle found for the lowest secondaries was 74

FIGURE 7.

degrees, the smallest 27 degrees. The usual angle is apparently somewhere between 40 and 50 degrees. The other and smaller secondaries likewise leave the midvein at various angles. These are, however, as a rule much larger than the angles at which the first two secondaries depart from the midvein. Sometimes the angles of departure of the smaller secondaries are as large as 90 degrees. The largest angle measured was 93 degrees. Another point in regard to the secondaries is that they are con-

fluent with the midvein before branching off. After leaving it they branch upward in the manner described, though they sometimes fork (Fig. 8).

Besides the larger secondaries described above, there also extend from the midrib a number of smaller ones that may be classed with the tertiaries, as they usually connect with them.

FIGURE 8. Leaf showing forked secondary.

It often happens, though, especially when there is a particularly large gap between any secondary and the one next succeeding it, that one of these smaller veins is so strongly developed that it takes the place of a larger one. They may, however, be easily distinguished from the others by the fact that they do not extend out far enough to form a part of the regular secondary system.

Connecting the secondaries with each other is a series of tertiaries which are much smaller than the veins just considered and which tend to form oblong or quadrangular areolae. Usually, they are rather uniform in size, but they often vary, particularly

those projecting from the outer and lower side of the first and largest pair of secondaries. When there is a narrow margin bordering these veins, the tertiaries proceeding from them are not very strongly developed; but when this margin is wide, they are very strong. Further, when one side is wider than the other the tertiaries of the wider margin are the more strongly developed.

Joining the tertiaries are the quaternaries which also exhibit a tendency to form quadrangular areolae. These, particularly when the tertiaries are strong, may be quite marked, but as a rule they are rather weak.

The nervation may now be briefly described as pinnate and camptodrome, with the two lowest secondaries very much larger than any of the others, while the tertiaries and quaternaries tend to form quadrangular areolae.

Finally, it may be noted that the facts here presented in regard to the form and venation of the leaves studied tend to show that the practice in vogue among paleobotanists of placing more emphasis upon the venation, for purposes of identification, than upon the form, is a sound one, based upon an appreciation of the more constant characteristics of the former.

THE VITALITY OF PINE SEED IN SERO-TINOUS CONES

By J. C. Blumer

It has long been observed by naturalists that the cones of the group of pines known as jack pines, and some others, often carried closed cones upon their branches for many years. As has been observed for *Pinus attenuata* by John Muir and others, this serotinous character may be a potent factor in producing the aggressive restocking of forest land that has been burned over, characteristic of several such species, a fact of importance in forestry as well as ecology.

In the southwest, this group of pines is represented by *P. chihuahuana*, and it has the same habit of carrying aged cones. One instance is on record in which a cone belonged to a node

originating 16 years previous to the time it was observed, and this period may often be exceeded. Probably it has the same capacity to invade burnt areas, though this the writer has not yet observed.

In order to obtain advantage over other species in such an invasion by this means, the closed cones should preserve vital seed. In the *American Naturalist* for November, 1909, Professor W. C. Coker reviews the literature on the subject, and adds results of his experiments made in 1909 at the New York Botanical Garden. An experiment is quoted as having been made by Professor Sargent in 1879, on the germination of seed extracted from cones of *P. contorta Murrayana* from Colorado, sent him by Dr. Engelmann. Out of 74 seeds held in cones from 7 to 10 years, 15, or 20 per cent., germinated. Seeds from cones 11 and 14 years old did not germinate. The seeds may have deteriorated during the five years in which the branches bearing them lay in St. Louis. Out of 534 seeds obtained by Professor Coker in North Carolina from cones which had been persistent for periods ranging from 4 to 10 years upon *P. serotina*, 226, or 42 per cent., germinated in filter paper and moss, and 307, or 57 per cent., in soil pots. Out of 162 seeds from cones hanging on the trees for 14 years, 40 germinated by the former, and 35 by the latter method, giving percentages of 25 and 22 respectively.

If any further proof is needed that such seeds preserve their vitality for a remarkably long time, the following should furnish it. In experiments made by the writer in the Seed Laboratory of the United States Department of Agriculture in 1904,* the germinative power of seeds of lodgepole pine (*P. contorta Murrayana*) which had been preserved in cones hanging on the trees for a period of 10 to 30 years was compared with that of seeds from cones less than 10 years old. The two lots of seed were gathered by C. A. Scott at Fairplay, Colorado, in 1903, being obtained at the same place and time, and stored in the same place. It will be noted that the species and state were the same as Dr. Engelmann's. The older seeds were separated by counting back 10 internodes from the ends of the branches, and picking the

* Germination of Pine Seed, Miscellaneous, Forest Service, U. S. Dept. Agr., 1907.

cones thence backward as far as found. Out of a total number of 3,000 seeds less than 10 years old, germinated in the laboratory under varying conditions, 928, or 31 per cent., proved vital. Out of 3,000 seeds from 10 to 30 years old, 1,346, or 40 per cent., were found to have preserved their vitality. Under the most favorable laboratory conditions the younger seed germinated 57 per cent., and the older 67 per cent. Six hundred additional seeds of the same lots were tested in soil, and they gave similar results. At Halsey, Nebraska, in nursery tests made by W. H. Mast, the younger seed produced 28 per cent., the older 47 per cent. of seedlings. At Pasadena, California, also in the nursery, T. P. Lukens obtained figures almost identical; viz., 27 per cent. for the younger, 45 per cent. for the older. At Washington, the older seeds only were tested in sand flats kept outdoors in occasional freezing temperatures. The following spring the result was a crop of seedlings amounting to 64 per cent. of the number of seeds planted.

The uniformly higher figures for the older seed does not mean that the seed improved with age instead of deteriorating, but simply that it was seed of better quality and that it probably lost little, if any, of its vitality. It was noted at the time of testing that the younger seed was less well filled, and lighter in both weight and color. In cutting open 400 seeds, it was found that only 53 per cent. of this was filled, as against 73 per cent. of the old seed. The cause did not lie in the direction suggested by a case reported by G. E. Tower,* in which the same species in the same state exhibits marked differences in the time of opening its cones according to the soil on which it grows. For all the seed came from the same stand of trees on the same kind of soil. It is possible that the younger seed came from younger trees, although, as nearly as could be learned, both lots came from the same trees. If the latter is true, the most likely cause would be the unfavorable character of the seasons producing the inferior seed, which might include both weather conditions and parasitic attack. However this may be, there is no longer any doubt as to the longevity of seeds held in serotinous cones.

* Proc. Soc. Am. Foresters, IV, No. 1.

Little difference appeared in the rapidity of germination (germinative energy) of the two lots in question, the seed requiring about 8–10 weeks under the better conditions. High temperatures hastened germination, and low ones retarded it, while the final percentages were lowered by both. Alternating temperatures, with a range of 15°–35° C. (59°–95° F.) or less, simulating the daily fluctuation in nature, proved most efficient in the class of pines possessing the habit of persistence of cones. Of stationary temperatures 35° C. was found to be the best. Although of the six species tested that belong to this class of pines the northern jack pine (*P. divaricata*) is the only one that germinates equally well at low temperatures, few show a decided lowering of their record by high temperatures. The shore pine (*P. contorta*), probably from California, actually made its best record at a temperature of 20°–50° C. (68°–122° F.). If nothing more, this at least indicates that the seeds are able to withstand with little injury a rather high degree of dry heat incident to the fires that open the cones.

Adding an observation on other pine seeds it may be noted that no such deterioration appeared in *P. ponderosa* and its variety *scopulorum* in 18 months as Professor Coker finds for *P. palustris*. Two tests of the first-named pine six months old germinated 68 and 85 per cent. respectively, while four tests 18 months old produced 64, 70, 71, and 85 per cent. of sprouts. The cause for the difference may be partly a matter of storage conditions, and partly an inherent tendency of the species bred by its native climate. In other words, the perishable character of the seed of *P. palustris* may be due, wholly or in part, to the warm and humid climate where the species is indigenous.

REVIEWS.

Macdonald's Dry Farming*

This neatly-bound book with nearly forty photographs illustrating various phases and processes of farming begins with a history of dry farming, which the author claims "has been

* Macdonald, William. Dry Farming: Its Principles and Practice. Pp. 290. Pl. 37. The Century Co., New York. 1909.

practiced since the dawn of civilization in Mesopotamia, in Egypt, and in northwestern India." Jethro Tull, who in 1731 published an "agricultural classic" on the "new horse-hoeing husbandry" is called the father of the new method, although his theory, that "tillage is manure" is not, of course, accepted now.

The book describes clearly dry farming as it is followed in various parts of the United States, with rules for successful practice, results that may be expected, and modifications in methods and results based upon the kind of soil, the depth of the water table, the size of the farm, and the climatic belt in which the farm is situated. The effects of different tools and implements used in tillage and the seasonal phases of dry-farming are also included. The book is elementary and simple enough for a high school boy, and yet wholly readable to any older person who thinks of dry-farming vaguely as a sudden and mysterious discovery of the "Golden West" which enables farmers to raise plants without water. JEAN BROADHURST

FIELD MEETINGS FOR 1910

The meetings for May are published in the Bulletin of the Academy of Sciences.

June 4. — New Rochelle, N. Y. Train leaves 129th Street and Third Avenue (N. Y., New Haven, and Hartford R. R., Harlem River branch) at 12.20 P. M. Returning trains leave at 4.00 and 5.00 P. M. Cost of trip about 25 cents. Guide, Miss Levy, who will meet the party at New Rochelle.

June 11. — West Englewood, N. J. Train leaves foot West 42nd Street (West Shore R. R.) at 1.15 P. M. A special study of swamp ferns will be conducted by the guide, Dr. Dowell, who will meet party at West Englewood. Buy return ticket. Cost of trip about 45 cents.

June 18. — Moonachie, N. J. Party will meet at the Rutherford Trolley, Hoboken, N. J., at 1.30 P. M., where they will be met by the guide, Mr. G. V. Nash.

June 25. — Springfield, L. I. A special study of the relation of insects to plants. Train leaves foot east 34th Street (Long Island R. R.) at 1.10 P. M. Returning trains leave at 4.46 and 5.45 P. M. Cost of trip about 70 cents. Guide, Dr. Southwick.

July 2–9. — The 1910 Symposium will be held in conjunction with the Philadelphia Botanical Club at Farmingdale, Monmouth Co., N. J. It will open at 8 P. M. on Saturday, July 2, with a discussion of the geological features and other points of interest at Farmingdale. Headquarters for the week will be at the American Hotel (rates two dollars a day, by the day; or ten dollars a week). Members are requested to make their own arrangements, and this should be done early as the accommodations are limited. A convenient train for the New York contingent leaves foot of Liberty Street (Central R. R. of N. J.) at 6.20 P. M. and arrives at Farmingdale in time for the opening of the symposium. Guide, Mr. Stewardson Brown.

July 16. — Great Kills, Staten Island. Buy return ticket at municipal ferry, foot of Whitehall Street, Manhatten. The guide, Dr. Hollick, will meet the party which arrives at St. George on the 9.00 A. M. boat from N. Y. Cost of trip about 40 cents.

July 23. — A study of medicinal flowers, leaves, and fruits at Moshulou, N. Y. City. Train leaves 155th Street and Eighth Avenue (Putnam Div. N. Y. Central) at 1.02 P. M. Returning trains leave at 4.37 and 5.13 P. M. Guide, Dr. Mansfield.

July 30.— Douglaston, L. I. Train leaves foot East 34th Street (Long Island R. R.) at 1.00 P. M. Returning trains leave at 4.05 and 5.00 P. M. Cost of trip about 50 cents. Guide, Mr. E. N. E. Klein.

August 6. — Special excursion for fungi to Cold Spring, L. I. Train leaves foot East 34th Street (Long Island R. R.) at 9.00 A. M. Returning trains leave at 4.49 and 6.51 P. M. Cost of trip about two dollars. Guides, Mr. Seaver and Mr. Dodge.

Members of the club are urged to verify the train times given above. In case of change it is understood that the train leaving nearest the advertised time will be the one used.

The chairman of the committee regrets that owing to unavoidable circumstances the determinations for the specimens collected on last year's field trips will have to be delayed.

The Field Committee,

NORMAN TAYLOR,

Chairman

PROCEEDINGS OF THE CLUB

March 8, 1910

The meeting was held at the American Museum of Natural History, beginning at 8.15 P. M. Mr. Charles Louis Pollard acted as temporary chairman, giving way soon to Vice-president Barnhart. Forty persons were present.

The minutes of the meeting of February 23 were read and approved.

The committee appointed to consider ways and means of increasing the influence and efficiency of the Club presented a report, which was read by its chairman, Miss Jean Broadhurst.

An application from Professor J. C. Arthur of Purdue University, Lafayette, Indiana, for a grant of $200 from the Esther Herrman Fund of the New York Academy of Sciences to further his researches upon the Uredinales was read and was ordered to be forwarded to the Council of the Academy with the endorsement of the Club.

The editor asked permission to publish as one of the Club's *Memoirs* a paper by Mr. O. Butler of Cornell University, entitled "Observations on the California vine disease". It was voted to refer the matter to the editorial board with power to act.

The secretary called the attention of members of the Club to a communication from Rev. L. H. Lighthipe, offering for sale back volumes of the *Bulletin*, *Memoirs*, and *Torreya*.

The following new members were then elected: Walter C. Cameron, 239 West 136th St., New York City; Rev. H. M. Denslow, D.D., 2 Chelsea Square, New York City; Bernard O. Dodge, 528 West 123d St., New York City; Carl A. Schwarze, 92 Stagg St., Brooklyn, N. Y.; and Sereno Stetson, 507 West 113th St., New York City.

The announced scientific program consisted of a lecture by Dr. Mel T. Cook on "Cuba: The People and Country".

The lecture was of a popular character and was illustrated by numerous lantern-slides. The speaker first showed views of the city of Havana, of its parks with their luxuriant tropical vegetation, and of the old fortifications which are being over-run by

various plants, causing the disintegration of the massive walls. Among such plants *Rhytidophyllum crenulatum* is the most prominent. Attention was next directed to the suburban driveways and country roads in both winter and summer conditions and to the trees that have been planted along their sides. These plantings consist principally of *Ficus religiosa*, *Ficus nitida* (which is commonly known as laurel), *Terminalia Catappa* (popularly called almond), royal poincianas, royal palms, and other well-known ornamental trees of the tropics. The palms are made use of for many purposes; they furnish shade for tobacco, and their leaves are employed for wind-breaks, in the construction of houses, in making coverings for tobacco bales, in making rain-coats, etc.

Allusion was made also to the work of the Agricultural Experiment Station at Santiago de las Vegas and to the agricultural conditions and products of various parts of the island. The speaker also showed views from thinly settled portions of Cuba, giving an idea of the scenery and the character of the indigenous vegetation.

Adjournment followed.

MARSHALL A. HOWE,
Secretary pro tem.

OF INTEREST TO TEACHERS

SOME REFLECTIONS UPON BOTANICAL EDUCATION IN AMERICA

BY W. F. GANONG

In the address with which he welcomed the American Association for the Advancement of Science to Columbia University three years ago, President Butler centered his remarks on a matter of the first scientific and educational importance. He said, in effect, that for a quarter century he had been a close and friendly observer of the progress of the sciences in education, that during this time he had seen them win almost complete recogni-

* Address of the retiring president of the Botanical Society of America, delivered at Boston, December 28, 1909. Reprinted by permission from *Science*, March 4, 1910.

tion and opportunity, but that he was obliged to confess to some disappointment at the results. He was not referring to the sciences in technical education, for in this field their status is satisfactory, but to their position in general or cultural education. He did not presume, he said, to suggest either an explanation or a remedy, but he submitted the matter to the consideration of his expert audience. These words of this eminent educational observer touched an answering chord in my own thoughts, and since that time I have found, by inquiry among my colleagues, that he voiced a feeling quite general among scientific men themselves. It seems, therefore, to be a fact that the sciences, although dealing in knowledge of matters of the greatest immediate interest, and although concerned with the most elemental of all trainings — that in the correlated use of hand, eye and mind — are still of mediocre efficiency as factors in general education. I propose now to discuss briefly the reasons I have been able to find for this undesirable condition of a part of our scientific affairs, and to suggest with particular reference to our own beloved science, some remedy therefor.

It will help to clarify our problem if we can come to an understanding upon certain points in the general relations of the sciences to education, the first being this — what place ought the sciences to have in education? I think we shall agree that the sciences can never, under any circumstances, hold a place in education nearly as prominent as that of the humanities. Man is not primarily a reasoning but a feeling being. As a philosopher has expressed it, "few men think at all and they but seldom." Hence the great majority of people in most part, and all people in some degree, can best be reached and influenced by studies which appeal primarily to the feelings, that is, by the humanities, while it is only a minority which can best be reached by studies appealing chiefly to the reason — that is, by the sciences and mathematics. But a minority has rights, and those to whom the sciences especially appeal, and to whom therefore they are of the higher cultural value, are just as entitled to efficient instruction in their subjects as are the majority in theirs. The sciences must always hold, from their nature in conjunction with that of hu-

manity, a position quantitatively inferior to that of the humanities, but they are entitled to a qualitative equality of educational rank and opportunity. This they do not yet possess, and it is alike our duty and our interest to see that they shall.

A second point of importance in the general relations of the sciences to education is involved in the fact that the times themselves are a bit out of joint, educationally speaking. This is not a matter of individual opinion, but of well-nigh universal agreement. The recent addresses of our younger college presidents have united in expressing dissatisfaction with the results derived from our superb educational equipment, while the remarkable declaration of principles of the National Educational Association, issued a year and a half ago, recognizes an equivalent condition for the schools. It is a fact that our students as a whole have many hazy impressions but little exact knowledge, are habitually inaccurate even in the three r's and have too little regard for intellectual matters. The cause of it all is obvious enough. Our education, step by step with our modern life, has become luxurized. Its features disagreeable to young people have been sedulously softened, their whims are determinants of educational programs, and the responsibility for learning has been largely shifted from them to their teachers. The wise Mr. Dooley has the modern college president say to the incoming freshman: "What branch iv larnin' wud ye like to have studied f'r ye be our compitint profissors?" and his humor as usual illumines a central kernel of truth. The trouble with our education is this, that it needs more starch; yea, it needs a bit more blood and iron. It ignores the fact that, with the mind as with the body, it is only through effort that strength can be gained, and through responsibility that character can be formed. It is not more work our students need, but work of a kind which does more to inculcate a willingness for effort, and pride in a Spartan devotion to duty — of a kind which enkindles in the heart of youth the precious spark of intellectual ambition. I would not exaggerate the defects of our present-day education. I know they do not go to the vitals, and certainly they are more serious in some places than others. But this granted, there yet remains too great

a deficiency, especially in educational morale. Our colleges are not going to the dogs, but they certainly permit some very queer mongrels to roam at large on the campus.

Now the application of these remarks to our present problem is doubtless sufficiently plain. In an educational system which too much permits inaccuracy of work, indefiniteness of knowledge, avoidance of effort, and whimsical selection of studies — in such a system the sciences, whose essence is care, exactness, persistence and consistency, have not a wholly fair chance. One of the principal reasons, therefore, why the sciences do not loom larger in present-day education is the fault of that education and not of the sciences.

A third point of importance in the educational status of the sciences is involved in the fact that they have not as yet had time to become organized and standardized for their most effective educational use. The humanities have behind them so many generations of experience that they are now measurably standardized throughout, and offer a continuous and suitably-graded training from kindergarten to college. But the sciences as laboratory-taught subjects are not much more than a single generation old, and many of their problems are still unsettled. In the higher grades our teaching is better than in the lower, while, as everybody knows, we are still far from any consistent and continuous system of instruction in nature knowledge in the lower schools. Just here lies a great weakness of scientific education at the present day, for students too often are sent into high school and college not only without the positive advantage of good early training, but even with a prejudice against a kind of activity of which they had little, or too often an unfortunate, experience. This condition is inevitable to the youthfulness, educationally, of the sciences, and will be remedied in time.

The last point I would mention in the educational relations of the sciences to the older subjects is this, that the sciences are under some minor disabilities from which the others are free. These center in the laboratory, and are connected in part with the fact that the laboratory type of study, with its mechanical manipulation, its fixed hours and methods of work, and its absolute re-

quirement of independent observation, is distasteful to the great majority of persons, who, whether by natural inclination or acquired habits, prefer to absorb their knowledge in physical ease, by methods which can be lightened by the wits, and from printed books upon which they can lean for authority. Again, laboratories are expensive, much more expensive than the equipment of the other subjects. This acts as a check to the sciences all along the line, while in poorer communities it is often determinative against their introduction at all.

Now it may seem, at this point, that I have needlessly infringed on your patience and my own allotment of time in thus enumerating such obvious matters, but in truth I have had a good object, which is this: I wish to emphasize that all of these disabilities under which science-teaching now labors, these elements of our problem which are not our own fault and for the most part are beyond our control, and the list of which I have made as long as I could, — all of these taken together go only a very small way towards explaining the deficiency of the sciences in education. This deficiency, I believe, is for the most part our own fault and removable, and it all centers in this, that we are not teaching our subjects properly. And now I have reached the real theme of my present address.

Whenever we are faced by any large problem, we tend to seek its solution in some single great factor. Yet, as the phenomena of our own science so often illustrate, the solution is as likely to be found in the cumulative action of several small causes, and such I believe to be true of the problem before us. These causes are some four in number, of which the first appears to be this — *we are not faithful to the genius of our subject.*

The genius of science consists in exact observation of real things, critical comparison of actual results, and logical testing of the derived conclusions. The educational value of science consists in a training in these things, and our teaching should reflect them. Yet in fact in too great part it does not. For one thing we have joined in the rush to render our subjects popular, a spirit which is one of the pernicious by-products of the elective system under which most of us work. Our subjects being elect-

ive, students will not take them unless they are made attractive; our success as teachers is largely judged by the number of students we can charm into our courses; our colleagues stand ready to cry "snap" to any course which grows faster than they can see cause for; therefore the logical procedure for the teacher is to draw great numbers but keep them complaining of the work, and he is the greatest teacher under this system who can attract so many students that a new building must be provided immediately, while their lamentations over the difficulty of the course are loud enough to reach the ears of all of his colleagues! Now this condition can be attained with quantity, though not with intensity, for most students will not elect a course involving intensive work which they cannot escape, but they are willing to elect one in which the work may be eased by the wits, no matter how copious the irrigation of information may be. Just here indeed is a very fundamental trouble with our education in general. We are teaching our students to gobble when they need to be taught to fletcherize.

Another phase of our treason to the genius of science is found in the belief and practise of some teachers that broad generalizations are the true aim of elementary teaching. I know a recent elementary text-book in which the author laments that "some teachers do not yet understand the importance of imparting to beginners a general rather than a special view point." And I could cite many passages to show a belief of this and some other teachers that subject matter, accuracy in details, and other fundamental verities of science, are not important in comparison with viewpoints and outlooks on life and that sort of thing. In my opinion there can be no greater educational error. There is no training which American youth needs more than that in a power to acquire knowledge accurately and to work details well. Disregard for particulars and a tendency to easy generalities are fundamental faults in American character, and need no cultivation, but, instead, a rigorous correction.

Another phase of our disregard of the genius of science is found in the bad character of some of our elementary teaching. Our plant physiology in some cases is so erroneous that it is

only the general badness of our teaching which saves us from the humiliation of having our errors pointed out by those we are trying to teach. Our elementary experiments ought to be conducted in the spirit of rigid control, just as carefully as in any investigation. The motto in the experimenting recommended by our text-books seems to be, "the easiest way that will give a result in agreement with the book," and we seem not to care whether that result is logically or only accidentally correct. In this spirit is the use of make-shift and clumsy appliances instead of accurate and convenient ones, something which is justifiable only when no better can possibly be had. Such slip-shod and inaccurate ways are not only wasteful of time and effort, but are actually pernicious because they inculcate a wrong habit and ideal of scientific work. I do not mean at all, here or anywhere, that young pupils should be made to study advanced scientific matters or to use technical methods, but simply that the treatment of their subjects according to their grades should be strictly scientific in spirit as far as it goes. Moreover, any attempt to avoid this spirit is the more unfortunate because needless, for as a matter of fact the great majority of young people respect exactness, and really like to be made to do things well. They do not like the process at first, and will avoid it if they can, but they like the result, and if the process be persisted in they come in time also to like that.

In a word the first great need of our science teaching is to make it scientific.

(*To be continued*)

This spring all teachers interested in the preservation of wild flowers ought to read The Passing of the Wild Flowers, a prize essay published by the *Journal of the New York Botanical Garden* last July. The writer, Miss Mary Perle Anderson, shows by actual tests made in the first five grades with one of the very comprehensive prohibitive signs now in use in Bronx Park that these placards are not easily comprehended by children. The conversations with various lawbreakers of all ages and nationalities are interesting and indicate clearly the general thought-

less and usually selfish attitude of so many park visitors; the willfully lawless are estimated at but five to ten per cent. of the offenders.

The parts of President Taft's message most interesting to botanists deal with the control of forests, the conservation of soils, and the irrigation of arid lands. They are reprinted below:

Control of Forests: "The forest reserves of the United States, some 190,000,000 acres in extent, are under the control of the Department of Agriculture, with authority adequate to preserve them and to extend their growth, so far as that may be practicable. The importance of the maintenance of our forests cannot be exaggerated. The possibility of a scientific treatment of forests so that they shall be made to yield a large return in timber, without really reducing the supply, has been demonstrated in other countries, and we should work toward the standard set by them, as far as their methods are applicable to our conditions.

"Upward of 400,000,000 acres of forest land in this country are in private ownership, but only 3 per cent. of it is being treated scientifically and with a view to the maintenance of the forests. The part played by the forests in the equalization of the supply of water on watersheds is a matter of discussion and dispute, but the general benefit to be derived by the public from the extension of forest lands on watersheds and the promotion of the growth of trees in places that are now denuded and that once had great flourishing forests goes without saying. The control to be exercised over private owners in their treatment of the forests which they own is a matter for state and not national regulation, because there is nothing in the Constitution that authorizes the federal government to exercise any control over forests within a state, unless the forests are owned in a proprietary way by the federal government.

It has been proposed, and a bill for the purpose passed the lower House in the last Congress, that the national government appropriate a certain amount each year out of the receipts from the forestry business of the government, to institute reforestation

at the sources of certain navigable streams to be selected by the Geological Survey with a view to determining the practicability of thus improving and protecting the streams for federal purposes. I think a moderate expenditure for each year for this purpose for a period of five or ten years would be of the utmost benefit in the development of our forestry system."

Conservation of Soils: "In considering the conservation of the natural resources of the country, the feature that transcends all others, including woods, waters, minerals, is the soil of the country. It is incumbent upon the government to foster by all available means the resources of the country that produce the food of the people. To this end the conservation of the soils of the country should be cared for with all means at the government's disposal. Their productive powers should have the attention of our scientists, that we may conserve the new soils, improve the old soils, drain wet soils, ditch swamp soils, levee river overflow soils, grow trees on thin soils, pasture hillside soils, rotate crops on all soils, discover methods for cropping dry land soils, find grasses and legumes for all soils, feed grains and mill feeds on the farms where they originate, that the soils from which they come may be enriched.

"A work of the utmost importance to inform and instruct the public on this chief branch of the conservation of our resources is being carried on successfully in the Department of Agriculture; but it ought not to escape public attention that state action in addition to that of the Department of Agriculture (as, for instance, in the drainage of swamp lands) is essential to the best treatment of the soils in the manner above indicated.

"The act by which, in semi-arid parts of the public domain, the area of the homestead has been enlarged from 160 to 320 acres has resulted most beneficially in the extension of "dry farming", and in the demonstration which has been made of the possibility, through a variation in the character and mode of culture, of raising substantial crops without the presence of such a supply of water as has been heretofore thought to be necessary for agriculture."

Arid Land Irrigation: "But there are millions of acres of com-

pletely arid land in the public domain which, by the establishment of reservoirs for the storing of water and the irrigation of the lands, may be made much more fruitful and productive than the best lands in a climate where the moisture comes from the clouds. Congress recognized the importance of this method of artificial distribution of water on the arid lands by the passage of the reclamation act. The proceeds of the public lands create the fund to build the works needed to store and furnish the necessary water * * * . It would appear that over thirty projects have been undertaken, and that a few of these are likely to be unsuccessful because of lack of water, or for other reasons, but generally the work which has been done has been well done, and many important engineering problems have been met and solved.'

NEWS ITEMS

At Leland Stanford George J. Pierce, associate professor of botany, has been advanced to professor.

Willis T. Pope, professor of botany in the College of Hawaii, has been appointed superintendent of public instruction for Hawaii, his position will be filled by Vaughan MacCaughey (Cornell, '08).

At the University of Missouri, assistant professor George M. Reed has been appointed assistant professor in charge of the department for the coming year. Dr. E. J. Durand of Cornell University has been appointed assistant professor of botany. The professorship in botany, made vacant by the resignation of Professor C. Stuart Gager, will not be filled for the coming year.

The illustrated public lectures at the New York Botanical Garden, which were begun in April, will continue until early in July. The coming lectures are "An Expedition to the Panama Canal Zone" by Dr. M. A. Howe, May 28; "Summer Flowers" by Dr. N. L. Britton, June 4; "The Rose and Its History" by Mr. George V. Nash, June 11; "The Native Trees of the Hudson Valley" by Mr. Norman Taylor, June 18; "The Extinct Flora of New York City and Vicinity" by Dr. Arthur Hollick, June 25; and "The Fungous Diseases of Shade Trees" by Dr. W. A. Murrill, July 2.

TORREYA

June, 1910

Vol. 10 No. 6

NOTES ON THE GENUS SAMBUCUS*

BY T. D. A. COCKERELL

There has recently appeared † a very interesting review of the genus *Sambucus*, by Fritz Graf von Schwerin, of Wendisch-Wilmersdorf, Brandenburg. It includes the species of the whole world, discussing them from every point of view, giving maps to illustrate distribution, and numerous figures, including a beautiful colored plate of the fruits. The genus is divided into seven groups: Ebulus, Eusambucus, Heteranthe, Scyphidanthe, Botryo-Sambucus, Tetrapetalus, and Tripetalus. In the first five, the corolla is five-lobed, in the manner normal for Caprifoliaceae; but the last two have it four- and three-lobed respectively. Tetrapetalus has a single species, confined to Australia and Tasmania; while Tripetalus has also only one representative, exclusively Australian. The austral distribution of these aberrant groups has naturally suggested the idea that they are the oldest members of the genus; and this conception is illustrated in a phylogenetic tree on p. 11, where Tripetalus appears as the stem-form, and Tetrapetalus, as a lateral branch near the base. In Tripetalus the fruits are golden-yellow, and hence it might be supposed that the yellow mutations found in the northern species are atavistic. There are, however, some reasons for doubting whether the three- and four-lobed groups really are primitive. In the first place, five lobes seems to be characteristic of the whole family Caprifoliaceae, as well as related families. In the second, meristic evolution usually proceeds by reduction, and it would seem, on general principles, much easier to derive a three- or four-lobed flower from a five-lobed, than the reverse. Finally, the most

* Illustrated with the aid of the Catherine McManes fund.

† Mitt. Deutsch. Dendrolog. Gesellschaft. No. 18. 1909

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ancient species of *Sambucus* known are in Baltic amber, of Oligocene age, and these actually have the corolla *more* than five-lobed! They are represented by beautifully preserved flowers, figured by Conwentz, *S. multiloba* having a seven-lobed, *S. succinea* a six-lobed corolla. *Sambucus succinea* Conwentz was originally described as *Ilex minor* Caspary, 1881. Conwentz changes the name because he says there is already a species *minor* among living *Sambucus*. This appears to be an error, as no such name occurs either in the work under review or the Index Kewensis; hence *S. succinea* is entitled to the name *Sambucus minor* (Caspary).

In this country, fossil *Sambucus* occurs at Florissant, in the Miocene shales. I have described one species as *S. newtoni* in Amer. Journ. Sci., 1908, p. 541. A second, very distinct by its long tapering leaflets, is represented by the very beautiful specimen figured herewith. It may be diagnosed as follows:

Sambucus amabilis n. sp.

General structure of leaf, including venation, inequilateral bases of upper lateral leaflets, and apparently texture, as in *S. neomexicana* Wooton, but leaflets much longer and more tapering, as the figure shows. The lateral leaflets are at least 100 mm. long, with a maximum breadth of 12 or 13 mm., the apex very long and tapering, quite different from *S. Newtoni*. The marginal teeth are finer than in *S. neomexicana*, being about 4 in 5 mm., instead of 2 or at most 3 as in *neomexicana*. The tapering leaflets are much more like those of *S. canadensis* in outline, but more finely toothed. The type specimen was collected at Station 14, in the Miocene shales of Florissant (*W. P. Cockerell*). As preserved, the leaf is light reddish.

One of the most interesting things in the geographical distribution of living *Sambucus* is the occurrence of a species of the Asiatic group Scyphidanthe in the mountains of German East Africa. This plant was originally described by Engler (Ann. Bot., 1904, p. 537) as *Sambucus ebulus africanus*, but it is really a form of *S. adnata*, and must be known as *Sambucus adnata africana*. By some accident, Count von Schwerin has overlooked Engler's publication.

A point to be investigated in our own flora is the southern extension of *S. melanocarpa* Gray. I have reason for thinking

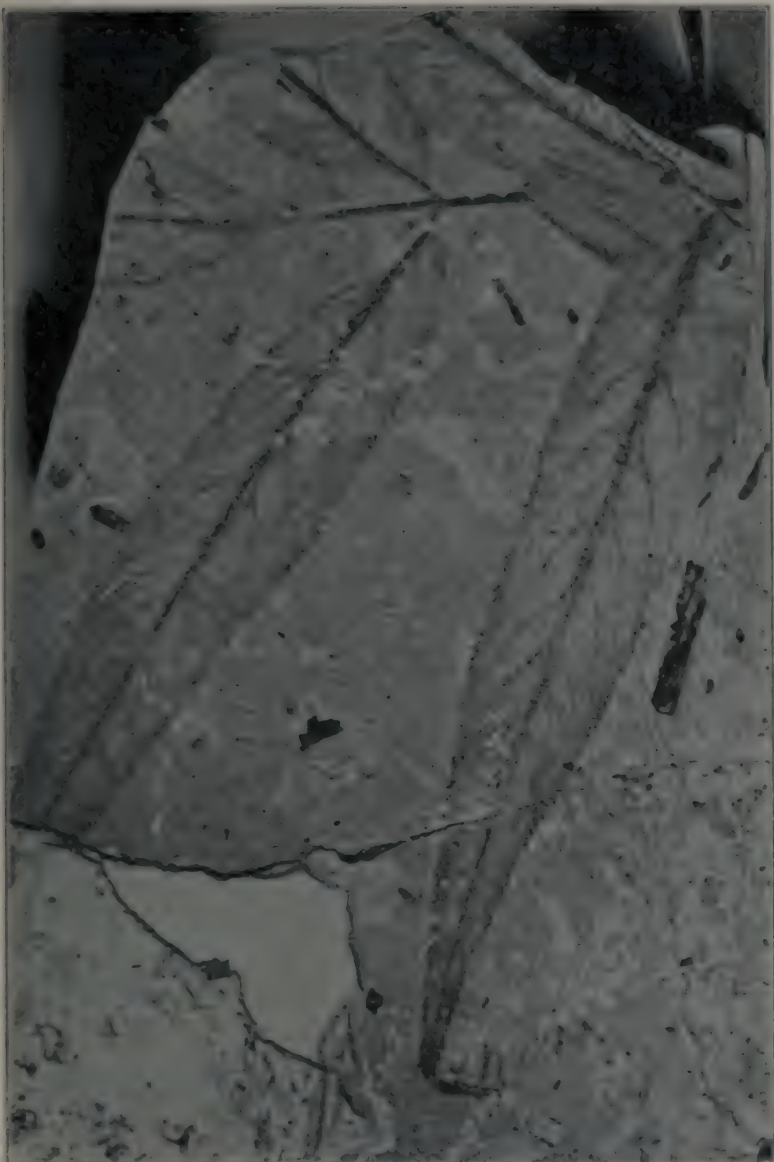


FIG. 1. *Sambucus amabilis*; Miocene shales of Florissant.

that many of the plants from Colorado so referred may rather pertain to the mut. *oinocarpa* (cf. TORREYA, 1904, p. 58) of *S. microbotrys*.

REVIEWS

Catalogue of the Flowering Plants and Ferns of Connecticut*

In the many contributions to the flora of restricted areas one, of two fundamental ideals, must color the whole tone of the work. One of these aims to present a list of all the plants which are known to grow in the area treated and to outline the local distribution of them. Such a work is subjective, a record of facts, and perhaps the only method that can safely be pursued in a preliminary treatment. At its best it is little more than a carefully prepared record of undigested and often indigestible facts.

Contrasted with this necessary but somewhat prosaic concept is the local flora which aims in some measure to *account* for the distribution of the plants in the area treated. A work of this character must digest the records of previous workers, or else begin the accumulation of new ones, and from this point onwards its aims are objective. It is not merely a record of facts but a projector of ideas. It does not confine itself to recording the occurrence of such a plant at such a place, but seeks to unfold the reason of its occurrence at that place and its non-occurrence elsewhere. That in most cases the attempt is an approximation to failure proves nothing, except the desirability of attempting a work, the failure of which postulates a vastly greater contribution to our knowledge of plants, than is conceivable in the most successful works of the old order.

It must be a matter of regret to those interested in local flora work hereabouts, that the recently issued catalog of Connecticut plants must undeniably be placed under the first of these cat-

* Catalogue of the flowering plants and ferns of Connecticut growing without cultivation. Prepared by a committee of the Connecticut Botanical Club. Published as Bull. 14. Conn. Geol. and Nat. Hist. Survey. 1–569 pp. Hartford. 1910.

egories. And it is an unwelcome surprise that a state of the historical antiquity of Connecticut, should not long ago have passed through this necessary, but confessedly preliminary, stage of the mere cataloging of plants and their known points of occurrence.

Taking the work as it is, however, and not as we had hoped it might be, it is a genuine pleasure to record its comprehensive and conservative treatment of the plants of the state. Only such plants are admitted into the list as have been seen by at least one of the members of the committee.* It is, then, certain that the plants listed in the catalog are all to be found in the state.

Much less certain are "some localities, . . . [which] rest upon the authority of collectors alone, when the species is once definitely admitted and there is no reason to doubt identity." While the present generation may be willing to accept such records, as in the majority of cases they are probably perfectly authentic, what must be the attitude of our successors in the work? If it is anything like our attitude towards the work of our predecessors, it will be a fine scepticism towards any station listed for which an accessible specimen is not extant. There is a long list of plants which the authors have excluded from the list on this reasoning, and they have even excluded some weeds of more or less fugitive character. These are all listed in a copious appendix.

From a taxonomic standpoint the work is shot through and through with the traditions of the Cambridge botanists, thus embodying the conservative and reasonable treatment of our eastern plants that is presented in the new Gray manual, so called. Any attempt to review the whole taxonomy of the work is impossible in such a short article but a few points call for comment.

In the genus *Potamogeton* the *P. bupleuroides* Fernald is admitted while the *P. perfoliatus* L. is not credited to the state. Even if one grants the specific validity of this coast segregate of Professor Fernald (which N. Am. Flora denies) what becomes of the inland forms of the *P. perfoliatus* L. as understood in the new sense? Specimens in the herbarium at New York from Litchfield are certainly true *P. perfoliatus* L.

* The gentlemen who have prepared this work are C. B. Graves, E. H. Eames, C. H. Bissell, L. Andrews, E. B. Harger, and C. Weatherby.

Under *Allium* more information would have been welcome under *A. canadense* L. Judging from our collection it is scarcely so common as to merit the remark, "Frequent." In the same family the inclusion of the genus *Hosta* is surprising, as both of the two species listed are usually only very doubtfully established escapes. Throughout the work there are many plants of this character included within the regular list. From the standpoint of the completeness of the record this is necessary, but it would have added to the general consistency of the work to have printed them in some distinguishing type, so that they might at a glance have been separated from the legitimate elements in the wild flora of the state.

The omission of *Quercus borealis* Michx. f. from the list is surprising, in view of the fact that all our best specimens of this plant come from Connecticut. It would be easy to multiply instances of this sort, but they are, for the most part, referable to differences of botanical parentage, and not therefore subjects which come within the scope of a short review. As the name of the work indicates it is a catalog and the lack of descriptions is not a very serious omission, but the introduction of keys would have almost trebled the value of the work to the general run of its users. Under most of the species there are notes on the economic or cultural uses of the plant. While these are interesting they have the tang of the book and candle rather than that of the botanically unsophisticated. And the space they take up would have been very acceptably filled with keys.

As a point of departure for future work on Connecticut this list will be a landmark and a bulwark. The care and devoted labors of the authors have been the means of making an invaluable record of the plants and their distribution. As such it is most welcome and the Connecticut Botanical Club is to be congratulated upon the completion of a book that will serve as a basis for all future work.

The appendix requires brief notice. It contains, besides a copious index, a list of corrections and additions, "Native plants not found in recent years", "Excluded species", "Fugitive species", "Statistical Summaries", and a list of botanical authors cited in

the body of the work. Much of this matter requires a great amount of labor and the clearing up of many of the points still in doubt will serve as a stimulus to the club in its future studies on the flora of Connecticut.

The book is a well printed volume of 596 pages, the thickness of which makes it a trifle bulky.

NORMAN TAYLOR

PROCEEDINGS OF THE CLUB

MARCH 30, 1910

The meeting was held in the museum building of the New York Botanical Garden, beginning at 3.30 P. M. Vice-president Barnhart occupied the chair. Seventeen persons were present.

The minutes of the meeting of March 8 were read and approved.

Professor J. C. Arthur, Dr. John Hendley Barnhart, and Professor Alexander W. Evans were elected delegates to the Third International Botanical Congress to be held in Brussels, May 14th to May 22d, 1910.

First on the announced scientific program was a discussion of "Exploration in Andros" by Dr. J. K. Small. An abstract of this follows:

"Recent exploration of the botanically little-known parts of Andros, Bahamas, carried on by the New York Botanical Garden, brought to light plants not only new to the flora of Andros itself, but also to the flora of the Bahamas. In order to carry out the plans made previously to entering the field, seven bases were selected along the eastern coast of the island, namely, Deep Creek, Smith Hill, Crow Hill, Lisbon Creek, Fresh Creek, Staniard Creek, and Nicholl's Town. The vessel was left at these points while the party, consisting of Mr. J. E. Aranha of the Surveyor General's Office of the Bahamas, Dr. J. K. Small, and Mr. J. J. Carter, together with such members of the vessel's crew as were needed, made excursions inland. Excursions were made on the one hand as far as it was possible to go on foot and on the other by a small boat to the headwaters of most of the creeks mentioned above.

"The topography of Andros is comparatively simple, and the

highest altitude is probably less than one hundred feet, still there is sufficient diversity in the general make-up of the island to support six different plant formations. Of course, the coastal region represents the usual littoral flora of the tropics. Along the eastern edge of the island is a limerock backbone of a single ridge or broken into several ridges. It extends nearly the length of the island or a distance of about ninety miles. This backbone ends more or less abruptly with the shore on the eastern side. On the western side, however, the usually several undulations extend mostly one or two miles inland and gradually die off in the flat country. Behind this rock ridge is a nearly level expanse, extending to the western side of the island, which varies from about eight to forty miles in width. The rock backbone is broken south of the middle of the island by three transverse channels known as Northern, Middle, and Southern bights. These bights make the four primary divisions of Andros. A second category of islands is formed by the numerous small cays in the bights and on the barrier reef along the eastern shore, which varies from one to four miles in width. A third category of islands is formed by the network of waterways resulting from the almost innumerable branches of the eight or nine principal creeks which break through the rock ridge of the eastern shore and the numerous creeks of the western shore. The region made up of this third category of islands is called the "Swash". The backbone of the island is covered with a hardwood forest called the "coppice". The swash is divided between five distinct plant formations, namely, "coppice", which exists here in isolated patches and not continuous as it is on the rock ridge, the "scrub", the "pineyard", the "Savannah", and the "marl".

"Andros is said to comprise fully one third the land area of the Bahamas. Approximately one thousand species of flowering plants are definitely known to occur on the islands of the Bahamian archipelago. Of this number about five hundred and fifty or over fifty per cent. of the Bahamian flowering plants grow naturally on Andros. An exceptionally large percentage of the plants are native mainly because such a small area of the islands is inhabited and cultivated. Less than a half dozen species are en-

demic. About three hundred and fifty species out of the five hundred and fifty growing on Andros, are known to occur in Florida, and many occur also in Cuba."

The second paper on the program was on a "Trip to Santo Domingo" by Mr. Norman Taylor. An abstract of the paper prepared by the speaker follows:

"The expedition covered the easternmost part of the Dominican republic, comprising the provinces of Samana, Seibo, and Macoris. Sanchez, a town on Samana Bay, was the first stopping place and was used as a base for the exploration of the Yuna River, the large swamp to the west of the town, and the mountainous part of the country in the vicinity. The country along the north coast, which is hilly, has an abundant rainfall and maintains a rich moisture loving vegetation, in striking contrast to the semi-xerophytic or actually desert flora of more sheltered and drier portions of the republic.

"An overland ride to the south coast furnished much valuable information as to the topographic and vegetative characteristics of the interior. In the province of Macoris, a section along the south coast, a large collection was made, with Consuelo, a sugar estate, as a base. The flora here is much the same as that seen along the north coast and the flat character of the country insures a large rainfall. Trips to La Romana, a town along the south coast, nearly at the eastern extremity of the island, netted some interesting cactuses, which seem to be the only representatives of this group that are arboreal in eastern Santo Domingo. From La Romana an excursion to Higüey, an interior town surrounded by large tracts of valuable timber, was made. An endemic *Sabal* and many interesting plants, as yet unnamed, were collected. A cruise to the island of Saona, the southeastern extremity of the larger island, resulted in the collection of *Pseudophoenix Sargentii* and many other distinctively Bahamian scrub plants. The low scrub growth here and a salt lake with a natural savanna surrounding it suggest very vividly some of the larger Bahamas."

"The expedition left New York on October 13, 1909, and returned January 2, 1910."

Adjournment followed.

Marshall A. Howe,
Secretary pro tem.

April 12, 1910

The Club met at the American Museum of Natural History and was called to order by Mr. E. B. Southwick, who presided in the absence of the President and both Vice-presidents. The attendance during the evening was one hundred and one.

Mr. Ralph C. Benedict was nominated a member of the Club. The resignation of Mrs. Carolyn W. Harris was read and accepted.

The announced paper of the evening on "A Visit to the Hawaiian Islands" was then presented by Miss Winifred J. Robinson. The lecture was illustrated by over one hundred lantern slides.

Adjourned.

Percy Wilson,
Secretary

April 27, 1910

The meeting was held at the museum of the New York Botanical Garden and was called to order at 3 : 30 p. m. by Vice-president Barnhart. Nineteen persons were present. After the reading and approval of the minutes of the meeting for April 12, the following persons were elected members of the Club : Mr. Ralph C. Benedict, Dr. Z. L. Leonard, and Dr. Gertrude S. Burlingham. The program of the afternoon consisted of a talk by Dr. N. L. Britton on " Recent Botanical Exploration in Cuba." The island of Cuba is about 670 miles long from Cape San Antonio to Cape Maisi and 100 miles at its greatest width. In area, Cuba is about as large as the state of Pennsylvania ; it has a flora consisting of over 4,000 flowering plants, nearly double that of Pennsylvania.

The topography of the island is exceedingly varied ; the greater portion is a plain lying a little above sea-level. This plain is broken at numerous points by isolated peaks, hills, and mountain ranges.

The collections made by the early botanists found their way to large herbaria of the Old World and contained a number of species which have not as yet been rediscovered. Following brief remarks on the collectors who have visited Cuba since

Charles Wright's time, Dr. Britton exhibited many interesting herbarium specimens secured on the recent expedition to that island.

He also reviewed the literature relating to the Cuban flora, after which discussion followed.

Adjourned.

Percy Wilson,
Secretary

OF INTEREST TO TEACHERS

Some Reflections upon Botanical Education in America

By W. F. Ganong

In a word the first great need of our science teaching is to make it scientific.

The second of the four principal causes of our inferior teaching is this, *we take more thought for our subject than we do of our students.* In the graduate teaching of a university this attitude is logical, but in college and school it is wholly wrong. I think we may express the matter thus, that any teacher who is more interested in his subject than in his students is fit only for a university. It is, I am sure, somewhat more characteristic of scientific than of other teachers that they tend to shut themselves up in their subjects, and to withdraw more than they ought from the common interests, duties and even amenities of the communities in which they live. For this, of course, the very attractiveness of science is largely responsible, because to those who have once passed the portals, science offers an interest so vastly and profoundly absorbing that all other matters appear small by comparison; and we are apt to conclude that the nobility and beneficence of such a mistress are sufficient justification for a complete immersion in her service. We forget that science has no existence apart from humanity, and no meaning unless contributory, however indirectly, to human welfare and happiness. And it should be emphasized to every young teacher that success in science teaching, as in so many other occupations, is well-nigh in direct proportion to one's ability to influence people. Our science teaching would be better

if our teachers trusted less to the abounding merits of their subjects, and more to the qualities which personally influence young people — the sympathetic qualities involving interest in their pursuits, the diplomatic qualities involving the utilization for good purposes of the peculiarities of human nature, the perfecting qualities involving the amenities and even the graces of life. There is no inconsistency between these things and the preservation of the scientific quality of the teaching. It is simply a question of the presentation of science in a manner which is humanistic. It is the gloving of the iron hand of the scientific method by the soft velvet of gentle human intercourse. Science is the skeleton of knowledge, but it need lose nothing of its strength and flexibility if clothed by a living mantle of the human graces. It is idealism with realism which is demanded of the science teacher, and if some one would rise to say that this union is logically impossible I would answer, that many a problem of this life unsolvable by the subtleties of logic can be settled by robust common sense.

Of our over-neglect of the personal peculiarities of our students I know several illustrations, but have space only for one. Young people appear to have in them some measure of Nägeli's innate perfecting principle, which leads them upon the whole to respect and like those things which are good and clean and dignified, a feeling which manifests itself in their strivings after good clothes, good society and things supposedly artistic, not to mention innumerable longings after the lofty unattainable. Now a dirty or carelessly-managed laboratory is a direct shock to this feeling, and most scientific laboratories sin in these features. I believe there is no part of a college or school equipment which ought to be prepared and managed with more care than a scientific laboratory. Efficiency for its purpose is of course the first requisite of any laboratory, but in college or high school that efficiency should be secured with attention to the utmost of pleasing effect, in the direction of a large simplicity, evidence of care for each feature, and an atmosphere of spacious and even artistic deliberation. As an example of what can be done by good taste to give a pleasing setting to the most unpromising objects, I commend the New

York Zoological Park, which embodies an idea much needed in most of our botanical institutions. We ought not to permit the accumulation of dusty and disused articles around laboratories any more than around libraries; our teaching museums should contain no crowded accumulations of half-spoiled specimens in leaky green bottles, but only a selection of the most important, and those in the best of receptacles well labeled and tastefully displayed. Our experiments with plants should not exhibit dirty pots on untidy tables, but every plant should present an aspect suggestive of considerate care, while all the surrounding appliances should glitter with cleanness and stand on a spotless table widely enmargined with space and neatness. One of my friends in a neighboring college has said of the methods of my laboratory that they savor of the old maid. I take pride in this compliment, for it shows I am advancing. All of these qualities of care, neatness, concentration upon a few large and worthy things, can be made to appeal greatly to youth, as I have learned from experience. Besides, they are scientific, and they are right.

There is yet one other phase of this subject of humanism in science teaching which I wish to emphasize. I think we do not make enough use in our teaching of the heroic and dramatic phases of our science, of the biography of our great men and the striking incidents of our scientific history. I know that their use is attended with dangers, dangers of false sentimentalism, of substitution of weak imagery for strong fact, of complication with religious prejudices; and they should therefore be introduced only as the teacher grows wiser. But when the tactful teacher can employ them to touch the higher emotions of his students, he should do so. The imagination is as necessary a part of the equipment of the man of science as of the man of letters or of art, a matter which has been illuminated with all his usual skill by President Eliot in his great address on the new definition of the cultivated man. When Darwin wrote his famous passage on the loss of his esthetic faculties he was a little unfair to his science and a good deal unfair to himself. For he never mentioned the compensation he had found in the intensity of lofty pleasure derived from his acquisition of new truth. Science hath her exaltations no

less than poetry, music, art or religion. Not only is the feeling of elation which comes to the scientific investigator with the dawning of new truth just as keen, just as lofty just as uplifting as that given by any poetry, any music, any art, any religous fervor, but they are, in my opinion, the same in kind. There is but one music heard by the spirit, and that is in us, whether it seem to come from the spheres, from the lyres of the muses, or from the voices of angels, and it gives forth when the last supremest chord in the soul of man is touched, it matters not by what hand.

We come now to the third of the causes which make our teaching of science defective, and it is this — *we put our trust too much in systems and not enough in persons.* And of this there are many evidences. For one thing we rely too much on a supposed virtue in buildings and equipment, though in this we but share the spirit of our machinery-mad day and generation. It is much easier for us Americans to obtain great laboratories and fine equipment than to make good use of them afterwards, and nowhere among us do I see any signs of a Spartan pride in attaining great results with a meager equipment. Moreover, we make a deficiency of equipment an excuse for doing nothing. As one of the most brilliant of American botanists once said, some persons think they can do nothing in the laboratory unless provided with an array of staining fluids which would make the rainbow blush for its poverty. A second evidence of our confidence in systems is found in the easy insouciance with which university professors proceed to write text-books for high schools. The only qualification the most of them have therefor is a knowledge of their subject, and they seem to regard any personal acquaintance with the peculiarities of young people, and with the special conditions of high school work, as comparatively negligible. In consequence these books are necessarily addressed to some kind of idealized student, usually a bright-eyed individual thirsting for knowledge. This kind does exist, but in minority, whereas the real student with which the high school must deal is one of a great mass willing to learn if it must. Confirmation of the correctness of my view that knowledge of students is as important as knowledge of subject for the writing of a high school book is found in the fact that the author

of the botanical text books most widely used in the high schools of this country has had only a high school experience. Another phase of our belief in the sufficiency of systems is found in the utterly unpractical character of many of the exercises or experiments proposed for the student in some of our books. These recommendations have obviously been worked out in the comfort of the study chair, and have never been actually tested in use by their suggestors; yet they are presented in a way to make the student feel that he is either negligent or stupid if he fails to work them. These theoretically constructed schemes for elementary teaching, and these recommendations of untried and impracticable tasks for students, sometimes run riot in company with sweeping denunciations of our present laboratory courses, and suggestions for their replacement by hypothetical field courses, utterly regardless of the fact that the former, whatever their faults, have been evolved in actual administrative adaptation to the real conditions of elementary work, while the proposed substitutes are wholly untried, and in the light of actual conditions, wholly impracticable.

On the other hand, there is one particular in which we have not system enough, and that is in the standardization of nature study and elementary science courses. I have already mentioned the advantage the humanities have in the approximate standardization of their instruction throughout the educational system, and towards this end for the sciences we ought to bend every effort. For one thing we should give all possible aid and comfort to our nature-study experts in their efforts to develop a worthy system of nature study in the grades. Again, the peculiar relation of preparatory schools to colleges in this country makes it imperative that we develop standard elementary courses which any school can give with assurance that they will be accepted for entrance to any college. Happily we are here upon firm ground, for we already possess such a standard course, or unit, in that formulated by a committee of botanical teachers, now the committee on education of this society. This course is formulated upon the synthetic principle, that is, it selects the most fundamental and illuminating matters offered by the science without regard to its artificial

divisions, and combines these in such manner as to make them throw most light upon one another. Its adaptability to our conditions, and its acceptability to our best educational opinion, is shown by several facts, by its adoption as the unit by the college entrance examination board which has been holding examinations upon it all over the country for six years past, by its use in innumerable high schools, by the agreement between its plan and that of all of the recent and successful text-books, by the final disappearance of all influential opposition to it, and lastly by the substantial concurrence of the unit now in formulation by the teachers of the middle west. With so firm a foundation in a plan we ought to be able to unite on perfecting details. There is no inconsistency between such standardization as this and the greatest freedom in teaching. The optical power of the microscope has not been injured by the standardization of its form and screwthreads.

(*To be continued*)

The April *Bulletin of the Torrey Botanical Club* contains an illustrated paper by Philip Dowell on the violets of Staten Island, with a simple key and named habits of all the island forms. Thirty hybrids are also named or described.

The Russian Agricultural Commission has a representative here studying the hardier American fruits and agricultural methods and machinery, with a view to introducing them into the Russian steppes; two representatives from Denmark — one from an agricultural college and one from an experiment station — are investigating our production and pathological treatment of forage crops.

A paper read at the Boston meeting of the American Association for the Advancement of Science showed the effect of various gases on sweet pea seedlings (inhibition of growth, swelling of the growing region, and horizontal placing of the stem). The authors, Knight, Rose, and Crocker suggest the use of these seedlings in detecting traces of illuminating gas, it being well known that gas leakage (in amounts too small for the usual chemi-

cal tests) often causes large losses to florists, especially in producing the "sleep" of carnations.

Science (May 6) in the botanical notes mentions an archaic type of seed from the Palaeozoic rocks which was first discovered in 1875 in England by Professor Williamson. It is 5–6 millimeters long and ribbed; the ten ribs forming so many separate arms which project beyond the nucellus for a considerable distance. The plants which bore these seeds have not been found; but Professor F. W. Oliver who described them (*Annals of Botany*, Jan., 1909) thinks the plants belong to the Cycadofilices, and that the seed is "the most primitive seed that has yet come to light."

Under the caption "Children of the Land" the *Outlook* (April 23) recently described the great school garden movement in Canada. It is really much more than that, for through the munificence of Sir William MacDonald under the management of Dr. Robertson (formerly of MacDonald College) a systematized attempt is being made not only to "adjust the schools and train the children that the children will be attracted to rural occupations and will be qualified to remain in them," but to give "practical illustrations of how the occupation in each locality may be made more attractive, profitable, and satisfying to those engaged in farming."

Professor Ira D. Cardiff, at the winter meeting of the American Association for the Advancement of Science described some aberrant walnut fruits from two trees, one in Indiana and one in Tennessee. The fruits (see also the *Plant World* for April) have a walnut-like basal part, while the opposite part is smooth and four-furrowed, suggesting the hickory. In all the endocarp is walnut-like; the trees in general aspect, bark (except for some hickory characters in the Tennessee tree), and leaves are walnuts. Cross-pollination is not believed by Professor Cardiff to account for the conditions; in each case the nearest hickories are (now) 30 meters from the trees under discussion, and the hybrid (?) character of the fruit is found in "that portion of the nut produced by the

parent sporophyte." A careful study is planned; it is thought that histological characters of the trees may indicate a cross.

The botanic garden papers read at the Boston meeting (A. A. A. S.) have been reprinted in *Science* (April 29, May 6,). In all the garden is discussed as a public institution, whether from the viewpoint of administration, rare plants, taxonomic completeness, or landscape effects. Professor Blakeslee's paper on the botanic garden as a field museum includes many suggestions, some of which feature in our better botanic gardens and which might be incorporated into many school gardens — even the small ones. A garden dictionary — and that of common things — is advocated rather than a "plant circus" where the curious may enter with the expectation of being surprised at oddities in nature and horticulture. Improvement under cultivation, plant diseases, and illustrations of heredity, variation, and hybrids (including even Mendel's law, failing to come true to seed, etc.) may be shown in odd corners of a school garden and with inexpensive material.

An interesting review of Researches on Fungi, by A. H. Reginald Buller, is given in *Science* (March 18) by Professor George F. Atkinson. The review includes brief mention of the geotropic curvature of the stem of certain mushrooms (in *Coprinus* an "overtilting or supracurvature four times before it came to rest in the perpendicular position"); the adjustment of the pileus in a horizontal position by the negatively geotropic stem, and the finer adjustment of the gills by their positive geotropism; the immense numbers of spores produced by single individuals (varying from 2,000,000,000 in *Agaricus campestris* to 7,000,000,000,000,000 in *Lycoperdon giganteum ;* the enormous spore waste, (in *Polyporus squamosus*, about one spore in a trillion has a " chance of starting a new successful cycle); the resuming of spore ejaculation by many of the xerophytic fungi which have been preserved dry for months or even years; and autodigestion of regions of the inky caps *following* spore dissemination, the spores being, it is held, anemophilous, and not mixed with the inky liquid and spread by insects.

NEWS ITEMS

At the University of Nebraska adjunct professors Walker and Pool have been made assistant professors of botany.

Professor William James Beal, having completed forty years of continuous service, will resign his professorship in botany at the Agricultural College of Michigan.

Professor John M. Macfarlane of the University of Pennsylvania is planning to spend the coming year in botanical study in several botanical centers of Europe.

Professor J. C. Arthur, Dr. John Hendley Barnhart, and Professor Alexander W. Evans represented the Torrey Botanical Club at the International Botanical Congress held in Brussels May 14–20. Dr. Barnhart also has a commission to purchase books for the library of the New York Botanical Garden.

Mr. W. W. Eggleston, recently of the New York Botanical Garden, has been appointed assistant botanist of the Forest Service, U. S. Dept. of Agriculture. He has been detailed for work in Colorado in investigations of poisonous forage plants in cooperation with the Bureau of Plant Industry. He left New York for his new field on May 28.

The Naples Table Association for Promoting Laboratory Research by Women hereby announces the offer of a fifth prize of one thousand dollars for the best thesis written by a woman, on a scientific subject, embodying new observations and new conclusions based on an independent laboratory research in biological, chemical, or physical science. For further information address the secretary, Mrs. A. D. Mead, 283 Wayland Avenue, Providence, R. I.

Announcements of the following summer schools have been received:

1. The Biological Laboratory at Cold Spring Harbor, Long Island; June to September; tuition $30; for further information address Dr. Charles B. Davenport, Cold Spring Harbor, Long Island.

2. The Mountain Laboratory for Botany and Zoölogy at Tolland, Colorado; June and July; tuition $20; information may be obtained from Dr. Francis Ramaley, University of Colorado, Boulder, Colo.

3. The Puget Sound Marine Station at Friday Harbor, Washington; no tuition fee, laboratory fees, $10; for further details write Dr. Trevor Kincaid, University of Washington, Seattle, Wash.

The New York State College of Agriculture announces two new fellowships in the department of plant pathology. One provides for the investigation of the use of dry sulphur as a fungicide (both to plants and in the soil) and is established by the Union Sulphur Company (New York City) with an annual appropriation of $3000 for four years. Mr. C. N. Jensen (University of Califfornia) and Mr. F. M. Blodgett (Cornell University) have been appointed to this joint fellowship. The second fellowship, by the Davey Tree Expert Company, provides $750 a year for investigating the heart rot of trees, and has been awarded Mr. W. H. Rankin (Wabash College).

TORREYA

July, 1910

Vol. 10 No. 7

LOCAL FLORA NOTES — IV

By Norman Taylor

Liliaceae

1. *Hemerocallis flava* L. This plant has been cultivated so commonly in our gardens that it is likely to become established at any time. Is it known to grow where it could be considered as unquestionably established?

2. *Allium carinatum* L. In the appendix to Britton's manual this plant is given as a naturalized plant in Bucks Co., Pa. Is it naturalized elsewhere? There are no specimens from the local flora range.*

3. *Allium canadense* L. The only stations represented in the collections are Crosswicks Creek, N. J., and two points on Staten Island. This common meadow garlic has a general range of Maine to Florida. The inference is unmistakable.

4. *Lilium Philadelphicum* L. There are a great many specimens in the collection. Curiously enough they all represent localities north of the terminal moraine. Whether this restriction is only accidental or whether it actually exists is entirely conjectural. Has anyone seen this plant south of the moraine? What is its distribution on Staten Island and Long Island? There are no specimens from either island.

5. *Lilium canadense* L. What has been said of *L. Philadelphicum* applies equally to this species. Apparently the restriction is not generic for *L. superbum* L. is found in New Jersey well to the southward of the moraine.

* The local flora range as prescribed by the Club's preliminary catalog of 1888 is as follows: All the state of Connecticut; Long Island; in New York the counties bordering the Hudson River up to and including Columbia and Greene, also Sullivan and Delaware counties; all the state of New Jersey; and Pike, Wayne, Monroe, Lackawanna, Luzerne, Northampton, Lehigh, Carbon, Bucks, Berks, Schuylkill, Montgomery, Philadelphia, Delaware, and Chester counties in Pennsylvania.

[No. 6, Vol. 10, of Torreya, comprising pages 125–144, was issued July 1, 1910.]

6. *Erythronium albidum* Nutt. The general range of this species is given as "Ont. to Minn., south to Ga.", etc. There are no specimens from our range, the nearest stations represented in the collection, being Albany, N. Y., and Alleghany Co., Pa. In Britton's catalog of New Jersey plants the species is doubtfully credited to the state. What is the distribution of the plant in our range?

7. *Erythronium propullans* A. Gray. The inclusion of this plant in these notes is probably quite useless. In Britton's manual the species is reported from New York. No specimens are extant from the range and the plant's general distribution almost precludes the idea of its occurrence. It may turn up in the higher Catskills.

8. *Aletris aurea* Walt. The plant is reported from southern New Jersey, according to Gray and Rusby. Apparently the report is not true, for at least some of the specimens on which it was based are *A. farinosa*. Has anyone ever seen it in southern Jersey? Otherwise its most northerly station is in Virginia.

Convallariaceae

1. *Clintonia umbellulata* (Michx.) Torrey. A single rather doubtful specimen from Short Hills, N. J., is all that was found in the combined collections. While the plant may be rare it seems scarcely credible that we know its true range. The general range is given as "N. Y. and N. J. to Ga.", etc.

2. *Vagnera racemosa* (L.) Morong. The only excuse for mentioning this common plant is that in spite of general statements that the plant is common throughout New Jersey, none of our specimens are from south of New Brunswick. Among the twenty-odd stations represented it is curious that this plant should be so restricted to the upper part of the pine land region. Elsewhere in the range it is very common.

3. *Vagnera trifolia* (L.) Morong. One specimen marked merely "Conn." is all we have from the range. With a general range of from Newfoundland to New Jersey and Pennsylvania it should be found in northern New Jersey, the hilly part of the counties in Pennsylvania, and almost certainly in the Catskills. Judging

from extra-territorial specimens in the collections the plant marked merely "Conn." came from the northern part of the state.

4. *Streptopus amplexifolius* (L.) DC. The only two stations represented by our specimens are in the higher Catskills. Presumably the species is found along the mountains south to North Carolina, but just how far down within our range it may be found is entirely unknown except by inference.

5. *Trillium erectum* L. Among the twenty or more stations represented there is only one on Long Island, at Glen Cove. Has this plant ever been seen south of the hilly back-bone of the island? In New Jersey the statement that it is found only in the middle or upper counties is quite correct, so far as our specimens show. Has the plant been collected south of a line extending from Perth Amboy to Belvidere, N. J.?

6. *Trillium undulatum* Willd. The most southerly station in our range is apparently the Pocono Plateau, Pa. With a general distribution reaching to Georgia on the south this plant can probably be found considerably further south than the Pocono region.

7. *Trillium grandiflorum* (Michx.) Salisb. There are no specimens from the range. The nearest locality to our area is Lancaster Co., Pa. The general distribution of this species postulates a wider range for it within our area than is evidenced by reports and specimens.

SMILACACEAE

1. *Smilax tamnifolia* Michx. Some specimens from southern Jersey show the plant's distribution in this region to be about as the manuals indicate. Neither of them says anything about the occurrence of this species on Long Island. An unquestionably authentic specimen from Rockville Centre, L. I., collected by Mr. E. P. Bicknell, gives rise to the query as to where else the plant may be found. There is a strong probability that the species will ultimately turn up in the intervening territory, particularly that which is of similar geologic structure.

2. *Smilax pulverulenta* Michx. With a general distribution of "Ontario to N. Carolina", etc., our single specimen from Bartow, New York City, quite obviously does not hint at the

plant's distribution in the range. It is doubtless common but specimens are desired to permanently record its true distributional status.

3. *Smilax Pseudo-China* L. In a footnote to page 239 of Britton's catalogue of New Jersey plants we read ". . . admitted into the Preliminary catalogue on the authority of Gray's manual, . . . not definitely known to me from the state." Dr. Britton's manual credits the species with a range from Maryland southward, but says nothing about any Jersey stations. The new Gray manual still credits the plant to southern New Jersey, but to offset this there is complete neglect of the species in the carefully compiled catalog of the plants of Philadelphia and vicinity. Has the plant ever been found growing in southern Jersey?

4. *Smilax hispida* Muhl. Although this species is supposed to grow "from Ontario to Va.," etc., our most northerly station is Andover, Sussex Co., N. J. Its distribution in the upper counties of Pennsylvania and in New York state above the Jersey state line is completely unknown.

5. *Smilax Bona-nox* L. Both manuals give New Jersey as a state in which this plant grows. The combined collections here do not show the plant as coming north of Virginia. The Philadelphia catalog excludes the plant from New Jersey but credits it to Delaware. If the station at Nantucket is correct,* the apparent lack of the plant between Maryland and Massachusetts is curious. If, on the other hand, the Massachusetts station should prove to be invalid we have still to account for the plant's distribution in south Jersey and adjacent Pennsylvania.

6. *Smilax laurifolia* L. The only two specimens from the range are both from stations just to the westward of Barnegat, N. J. The general distribution of "southern New Jersey" includes more territory than the specimens in our collections represent. A northern extension of the range may be looked for.

7. *Smilax Walteri* Pursh. There is a very meager representa-

* E. P. Bicknell in his serial flora of Nantucket, now appearing in the bulletin of the Torrey Club, says that the occurrence of this plant in Massachusetts is doubtful, and excludes it from the island, the only recorded occurrence of it in that state.

tion of this species in the collection, the only definite locality recorded being May's Landing, N. J. It should occur commonly in the pine-barren regions of the state.

New York Botanical Garden

REVIEWS

Greene's Landmarks of Botanical History*

Julius von Sachs' well-known history of botany from the sixteenth century to the year 1860 is confessedly brief in its treatment of the beginnings of botanical science. Furthermore, it was written as a volume of a series on the history of the sciences in Germany and is somewhat predominantly German in its outlook, even though it must be admitted that the modern developments of the science of botany have, in a large measure, been fostered on German soil. And, again, this work, like its recent continuation by Professor J. Reynolds Green (1909), was written by a botanist who was primarily a physiologist, and the physiological aspects of the science are the ones that receive the most adequate treatment. The historical works of Sprengel (1807–'08) and of Meyer (1854–'57) do more justice to the very interesting beginnings of botanical literature, but they were never translated and are less well known to English and American readers.

This first instalment of Doctor Edward Lee Greene's "Landmarks," covering the period prior to the year 1562, will therefore prove most welcome to the many botanists, both amateur and professional, who have been awaiting a readable scholarly account of the earlier phases of the development of their science. A reader equipped with a certain amount of knowledge of the morphology of plants and with a certain degree of personal familiarity with plants in the field and garden is likely to find Dr. Greene's elegantly phrased paragraphs so interesting and illuminating that the book, once opened, will hardly find its way to the shelves until it has been read through.

*Greene, Edward Lee. Landmarks of Botanical History. A Study of Certain Epochs in the Development of the Science of Botany. Part I—Prior to 1562 A. D. Smithsonian Miscellaneous Collections, part of volume 54. Pp. 1–329. 1909.

The present part of the "Landmarks", after the preface and the introductory remarks on the "Philosophy of Botanical History", includes nine chapters, with headings as follows: I. The Rhizotomi; II. Theophrastus of Eresus, B. C. 370–286 (or 262); III. Greeks and Romans after Theophrastus; IV. Introductory to the Sixteenth-Century German Fathers; V. Otho Brunfelsius, 1464–1534; VI. Leonhardus Fuchsius, 1501–1566; VII. Hieronymus Tragus, 1498–1554; VIII. Euricius Cordus, 1486–1535; IX. Valerius Cordus, 1515–1544.

In the introductory chapter on the "Philosophy of Botanical History", the author discusses in a very entertaining manner the development of human ideas in regard to the plant world and the early attempts to arrange these ideas in an orderly fashion. "Botany", he says, "did not begin with the first books of botany, nor with the men who indited them; though every historian of the science whom I have read has assumed that it did. The most remote and primitive of botanical writers, of whatever country or language, found a more or less extensive vocabulary of elementary botany in the colloquial speech of all". He then goes on to show the baselessness of "the fond conceit" "that there was never anything in the world that could be called science until some three centuries ago, or four, at the farthest."

Among the ancient Greeks were the rhizotomi, "mostly illiterate men and quacks" whose root-gathering for medicinal purposes was often accompanied by prayers, incantations, and other curious ritual, but some of them studied the nature and properties of plants in a scientific way and wrote books, which were quoted by Aristotle and Theophrastus. One of these, Cleidemus, is said to have "investigated diseases of plants, especially of the fig-tree, olive-tree, and vine." Professor Greene pronounces him "the earliest of vegetable pathologists". Another of these protobotanical Greeks, whose writings are known to us only from excerpts made by their more illustrious countrymen, was Hippon, concerning whom the author of the "Landmarks" has the following paragraph:

"Hippon was among the rhizotomi who philosophized about plants in general, and wrote books. His writings are quoted by

both Aristotle and Theophrastus, and he appears to have been the earliest among students of plant life and form to venture the opinion that all cultivated trees, shrubs, and herbs have been derived from wild ones, and are susceptible of reversion to their pristine condition. It is the earliest hint—and a very early one, apparently unknown to the annalists of evolution—of what cultivation may accomplish in the way of transformation. But the doctrine must have had the sound of a heresy verging toward atheism in the ears of a populace that had never questioned the proposition that every cultivated plant and tree had been coeval with the human race, and had been so created at the first."

But the longest, by far, of the chapters of the present part of the "Landmarks" is that devoted to Theophrastus of Eresus, whom Linnaeus called the Father of Botany, though in later years that title has sometimes, by the less discriminating, been transferred to Linnaeus himself. Several pages are given to what is known of the personal history of Theophrastus, including many interesting details of his relations with Aristotle, his teacher, patron, and devoted companion. A personal sketch of this sort, by the way, accompanies the discussion of the work of each of the early botanists considered in the succeeding chapters, a feature that for many readers will doubtless contribute much to the interest and attractiveness of the book. The botanical work of Theophrastus is treated under the general headings, "Method", "Vegetative Organography", Anthology", "Fruit and Seed", "Anatomy", "Phytography", "Taxonomy", "Ecology", "Dendrology", and "Transmutation", followed by a "Recapitulation". In his studies of flowers Theophrastus recognized the centripetal and centrifugal types of inflorescence, the hypogynous, perigynous, and epigynous modes of insertion of the corolla and androecium, and the fact that the "head" in the composites is a flower-cluster and not a single flower. In regard to the inflorescence of composites Professor Greene remarks: "Less than three generations ago, eminent systematists were still writing up the scales of such involucres as 'sepals', the whole involucre as a 'calyx', and the circle ray flowers as the 'corolla'. At this juncture the sublime old Greek will appear to have lived before his time by more than two thousand years." In connection with the

observations of Theophrastus on germinating seeds, the author of the "Landmarks" has the following:

"To the beautiful work of a Malpighi one gives somewhat more credit than is fairly due it, until one has read these chapters of the ancient Athenian master. Then it is clearly apprehended that the man of the seventeenth century may have received the suggestions of his own work directly from the Greek philosopher; and is almost ready to add that the beautiful drawings of sprouting grain adorning Malpighi's folio might almost have been done from the Theophrastan descriptions of the same. It must needs be conceded that the botanic garden at Athens, founded by Aristotle, and the earliest of which there is any record, was wonderfully prolific of new botanical facts of profoundest import."

Theophrastus appears to have had little sympathy with popular notions of his day as to the possible changing of plants into others of different kinds. In regard to one phase of this belief he observes: "Some say that barley changes to wheat sometimes and wheat to barley, and that in the same field. Such statements are to be received as fables. Changes of that kind would be without a cause. It is diversity of condition that induces change."

Under the heading "Taxonomy", Dr. Greene discusses in a very interesting and instructive manner the ideas of Theophrastus in regard to genera and various other aspects of the interrelationships of plants. The author candidly admits that "one ascertains with difficulty, if at all, what the historian is most in need of knowing, namely where this writer of the first book of botany is recording points of taxonomy that are of prehistoric discovery and universal traditional acceptance, and where he is introducing some amendment or improvement of his own." These words were written especially of some of the primary groupings of plants made by the Greek philosopher, but Dr. Greene, we think, would be the first to acknowledge and does acknowledge, by implication, at least, that the same difficulty obtains in connection with the generic names adopted by Theophrastus—a reflection that might well give pause to any one who, in quest of primal historic truth and absolute justice in matters of botanical nomenclature, would be so bold as to cite Theophrastus as the author of any particular generic name.

The influence of Theophrastus in fixing the names of plants is well summed up in the following passage:

"Pliny, the supreme Latin writer about plants, in translating Theophrastan texts by the hundred into Latin for Roman readers, made use of familiar Latin names in place of the Greek names when there were such, *e. g.*, instead of the Greek itea he wrote salix; in place of drys, quercus; Latin ulmus, sambucus, and ranunculus in place of Theophrastan ptelea, acte, and batrachium. There were still many scores of plant types which were known to Latins by no other names than those that had been assigned them in Greek; another evidence that Theophrastus by his books had been the one teacher and authority upon botany to Latins as well as Greeks. Platanus, cerasus, rhamnus, anemone, thalictrum, delphinium, helleborus, paeonia, and a host of other such remained the only names of the genera, whether one spoke or wrote in Latin or in Greek; and so during some seventeen centuries most of the plant names in use were quoted from Theophrastus. The popular fable about Linnaeus as first nomenclator of botany is not yet a hundred years old, and will need to be perpetuated for sixteen centuries yet to come if the years of his nomenclatorial fame are to equal those during which Theophrastus held the prestige."

As a particular instance of the Theophrastan conception of genera Dr. Greene cites the four species of water-lilies for which recent writers use the names *Nymphaea lutea*, *Castalia alba*, *Castalia Lotus*, and *Nelumbo speciosa*—species which Linnaeus grouped in the single genus *Nymphaea*, although Theophrastus had them under the four names Nymphaia, Sida, Lotos, and Cyamos, respectively. Referring to the generic relationships of these four plants, Dr. Greene remarks, . . . "recent systematists have well-nigh completely returned to the Theophrastan view, in all save the names of genera; and the restoration of even these will follow under the law of priority." It will hardly be denied, we think, that, although the botanists of the present generation may profit by some instruction as to the merits of Theophrastus, very few of them will feel any necessity, either moral or practical, for adopting the botanical language of the Greeks to any greater extent than they have already adopted it through inheritance. And, in the opinion of the reviewer, the prevailing sentiment of the botanists of the present day in this particular is likely to be

strengthened rather than weakened as the time-distance from Theophrastus increases. Nevertheless, it must be admitted that Dr. Greene's sympathetic and masterly interpretation of the writings of Theophrastus has brought the "Father of Botany" appreciably nearer to the botanists of the present age.

Among the botanical writers discussed in the chapter on "Greeks and Romans after Theophrastus", the principal are Nicander of Colophon, Cato, Varro, Virgil, Columella, Dioscorides, Pliny, and Galen. "The scientific botanist among the Greeks", Dr. Greene observes, "was Theophrastus; and there is no comparison between him and Dioscorides, whose theme was medical botany; but, quite as usual, the man of 'applied science' was the one to meet with general appreciation and approval. . . . Latin editions of Dioscorides are too numerous to be given a reckoning; and almost the same may be said as to early translations of him into modern tongues; for between the years 1555 and 1752 there were at least twelve Spanish editions, as great a number in Italian". And there were several editions, also, in French and German. Nicander, a Greek grammarian and poet, wrote, it seems, a versified dissertation on poisonous fungi and another on the cultivation of edible mushrooms. The Roman writers treated of plants chiefly in their relations to horticulture and agriculture. "Cato (B. C. 235–149) knew 125 kinds of plants, Varro (B. C. 117–27) mentions 107, Virgil (B. C. 70–19) 164. Yet the sum total of the plants of these Romans, 245, is only about half the number that had been known by Theophrastus some 300 years earlier."

The sixteenth-century "German Fathers" whose lives and works are interestingly set forth by Dr. Greene are Brunfels, Fuchs, Tragus, Euricius Cordus, and Valerius Cordus. The author of the "Landmarks" is so bold as to say that the works of the "German Fathers" have been quite inadequately examined even by the German historians. "Julius von Sachs, the latest in the line, copied Sprengel's caption 'The German Fathers', etc., but knew next to nothing of their works, even rating as unimportant Valerius Cordus, who was immeasurably the greatest of them all."

Brunfels and Fuchs were concerned almost wholly with medical botany. They both illustrated their principal works copiously with the idea of improving upon certain other plant illustrations then in vogue and with the intention of facilitating the identification of plants used in medicine. Their descriptions were copied or compiled from Theophrastus, Dioscorides, Pliny, Galen, and other ancient writers, with occasional annotations and discussions of their own. The works of Brunfels and of Fuchs enjoyed great popularity, but Dr. Greene considers it "superlative" to include these two worthies among the "German Fathers of Botany", though some such title as "Fathers of Plant Iconography" might fittingly be bestowed upon them. But the works of Tragus and of Valerius Cordus were of another character, and these two authors may justly be called the "Fathers of Descriptive Botany". "Both these were deeply interested in plants of all kinds; were given to examining their organs minutely and marking the behavior of certain growths at different stages, and all this before even having thought of writing books thereon. . . . They were under an inspiration of a new idea in botany, namely, that plants might be so described as to be identified by description."

Euricius Cordus is chiefly interesting "as having been the father and educator of that most brilliant of early German botanists, Valerius Cordus." However, he wrote a booklet, the "Botanologicon", in which he exposed the folly and danger of trying to make the descriptions of Grecian medicinal plants always fit the plants that are native in Germany. Valerius Cordus, who died of a fever in Rome at the early age of 29 years, has been characterized by the historian Meyer as "a splendid and all too transitory phenomenon." The chief work of Valerius Cordus, entitled "Historia Plantarum", was not published until seventeen years after his death. The young Cordus described living plants in a very accurate, systematic, and independent fashion. In connection with his work Dr. Greene remarks:

"Cesalpino, of the end of the sixteenth century, will be praised in future milleniums for having founded Systematic Botany. But had Valerius Cordus lived to only twice his nine-and-twenty years, it is easy to conceive that the great Italian might have

missed his laurels. Among the nature students of four hundred years ago I know not who else is so far from accepting things on other people's guess or hearsay as Valerius Cordus; in whom I have not yet read a line that savors of the fabulous or superstitious; and that, for the period, is much to say of any author."

In face of the erroneous and more or less superstitious notions as to the reproduction of ferns that were then current even among the best-educated, Cordus boldly ventures the following in regard to the trichomanes fern:

"It grows copiously on moist shaded rocks, although it produces no stem, or flower or seed. But it reproduces itself by means of the dust that is developed on the back of the leaves, as do all kinds of ferns; and let this statement of the fact once for all suffice."

And the following paragraph from Dr. Greene's work, relating to one of the observations made by this clear-seeing and clear-thinking German youth, who died as long ago as 1544, will be of historical interest to many economic botanists of the present day:

"The plant physiologist of to-day, interested in the functions of the root tubercles of leguminous plants may find in Valerius Cordus the earliest mention of these organs. I do not find him taking note of them except as occurring in the cultivated lupine of Europe. Accustomed to give a full account of every kind of root, even to its medicinal usefulness or uselessness, he says of that of the lupine that it is 'slender, woody, white and without useful properties, parted into a few slender fibers upon which there sometimes grow small tubercles.'"

Part I. of Dr. Greene's "Landmarks" covers a most interesting and hitherto inadequately treated period in the history of botany. The work will be needed by all libraries that contain Julius von Sachs' well-known history and by all botanists who feel an interest in the recorded beginnings of their science.

Marshall A. Howe

FIELD MEETINGS FOR 1910

In the *American Naturalist* for January, 1899, Dr. Arthur Hollick has pointed out the great influence of the geological formation on the forest conditions of New Jersey. All the territory

to the north of a line stretching from Perth Amboy to Trenton is predominately of deciduous trees, mostly of northern extraction and affinities. South of the line from Long Branch to Salem (roughly the pine-barren country) the forest is predominately coniferous. The region between these he has called the tension zone, from the fact that the trees of each opposing zone are in this middle zone apparently striving for predominance. Some of the field meetings this summer will be held with a view to ascertaining how far Dr. Hollick's observations obtain among the rest of the vegetation in this region. An effort will be made to extend the range of some of the typically southern or coniferous plants northward, and to trace the migratory tendencies of the northern plants southward. Observations will be made also on plants with apparently no very definite habitat preference.

The meeting of Saturday, August 13, will be in the museum building of the New York Botanical Garden and will consist of a lecture at 4:00 P. M. by Mr. Norman Taylor on "Influences which Govern Local Distribution of Plants." This will deal with the above and similar ecologic problems.

August 20. Monmouth Junction, N. J. Train leaves Hudson Terminal Station (Penna. R. R.) at 9:35 A. M. Cost of trip about $2.00. This is at the edge of the deciduous zone and the adjoining tension zone.

August 27. Runyan, N. J. Train leaves Hudson Terminal Station (Penna.) at 9:05 A. M. Returning train leaves at 5:57 P. M. Cost of trip about $1.50. This is directly in the middle of the tension zone.

September 3. Freehold, N. J. A seven-mile walk is planned which will extend from Freehold to Farmingdale crossing from the tension to the coniferous zone during the walk. Train leaves Liberty Street (Central R. R. N. J.) at 8:30 A. M. Return train from Farmingdale leaves at 3:56 P. M. Cost of trip about $2.75.

September 10. Windsor, N. J. Train leaves Hudson Terminal Station (Penna. R. R.) at 9:05 A. M. Returning train at 5:03. Cost of the trip about $2.00. This is in the middle of the tension zone, but further down than Runyan.

The chairman of the field committee will act as guide on all

the above trips and in each case will meet party at destination. Other trips have been planned as follows:

September 17. Arlington, N. J. Train leaves Hudson Terminal Station (Erie R. R.) at 12:45 P. M. Return as desired. Cost of trip about 30 cents. Guide, Mr. O. P. Medsger.

September 24. Mt. Hope, N. Y. Train leaves 155th Street and Eighth Ave. (Putnam Division, N. Y. Central) at 9:15 A. M. Returning trains leave at 4.14 and 6.02 P. M. Cost of trip about 50 cents. Guide, Mr. Chas. VanLoan.

October 1. Special excursion for mosses to Alpine, N. J. Party will take the one o'clock boat from Peene's wharf, Yonkers, N. Y. Cost of trip about 30 cents. Guide, Mr. Williams.

October 8. West Orange, N. J. via Orange. Train leaves West 23rd St. (D. L. & W. R. R.) at 9:10 A. M. Thence as directed by the guide, Mr. Wilson.

October 15. Special excursion for asters to Wakefield, N. Y. City. Party will meet at the terminal of the Third Avenue elevated at 1:00 P. M., where they will be met by the guide, Dr. Rydberg.

Members of the club are urged to verify the train times given above. In case of change it is understood that the train leaving nearest the advertised time will be the one used.

The Field Committee,
NORMAN TAYLOR,
Chairman

PROCEEDINGS OF THE CLUB

MAY 10, 1910

The meeting was called to order at the American Museum of Natural History at 8:25 P. M. Mr. E. B. Southwick occupied the chair. The attendance was twenty-four. After the reading and approval of the minutes of the preceding meeting, Mr. Norman Taylor spoke on "Native Trees of the Hudson Valley." The following abstract was prepared by the speaker.

"There are about 125 different kinds of trees in the area. Excluding highly technical and little known species, and those

so rare as to escape common notice, there are about 68 species of trees common in some part of the valley, often throughout it. A short popular account of most of these, illustrated by lantern-slides, aimed to bring out the salient features of the different kinds, and to draw attention to their principal economic or cultural uses."

Adjourned.

PERCY WILSON,
Secretary

OF INTEREST TO TEACHERS*

BY W. F. GANONG

SOME REFLECTIONS UPON BOTANICAL EDUCATION IN AMERICA

I come now to the fourth of the reasons why our science teaching is defective, and that is the most vital of all. *Our method of training teachers is wrong.* I believe it is true that in general our educational advances work down from above—from university to college, from college to high school and from high school to the grades; and in a general way each of these institutions is the finishing school for teachers of the grade below. Now the work of our universities is for the most part admirable in every way, but they are not good training schools for college teachers. One of the greatest of our college presidents lately remarked that the principal obstacle in the way of making a college what it ought to be is the difficulty nowadays of securing the right kind of teachers. "We have to take them as the universities supply them," he said, "and then make them into good college teachers afterwards." The defects of the universities in this respect are two-fold. First they are training students only for their own kind of activity, in which everything centers, very properly, in research; and second, they are omitting to teach divers matters very essential for the college teacher to know.

That our universities make research the central feature and great leading method of their training of graduate students is

*Address of the retiring president of the Botanical Society of America, delivered at Boston, December 28, 1909. Reprinted by permission from *Science*, March 4, 1910. See TORREYA for May and June.

natural, logical and correct, so far as training for their own kind of activity is concerned; but it ignores the fact that only a minority can remain in that work. The justification of the training of all by a method which is correct only for a minority is usually expressed in this form, that he is the best teacher who is an active investigator. Now if this is qualified by the proviso "other things being equal," it is approximately true; but in fact other things very rarely are equal, and in the matter under discussion they are profoundly unequal. In my opinion the imposition upon all university students of the university research ideal is doing vast harm to our teaching in college and therefore in high school. For one thing, it sends out ambitious young men imbued with the feeling that they must maintain their research at all costs, or else forfeit the good opinion of their teachers, the possibility of membership in the best scientific societies, and especially any chance for a call to university work, though this latter point should not be given great weight, since to a person with a liking for teaching a good college offers as attractive a career as a university. In consequence there is a continual pressure on the teacher to subordinate his teaching to research. Now in college and high school this is wrong, ethically and practically. A college teacher is never engaged for research, but for a very different purpose, and it is his first duty to carry out that purpose to the very best of his ability. If there is any man who can carry on active investigation and at the same time do college or high school work as well as if he were concentrating wholly on that, the man is fortunate, and so is the institution which has him. But in fact this can rarely be true. For one thing, the limitations of time and strength prevent it in most cases; and for another the qualities and temper required for the two activities are not only different but somewhat antagonistic. Research requires concentration and much consecutive time fixed by the nature of the work, while the teacher must be ready for constant interruptions, and must regulate his time to fit the schedules of his students. To one immersed in the critical stage of an investigation the little troubles of students seem absurdly trivial, if not stupid, and under their application for aid he is almost

more than human if he can keep a sweet temper and not answer with repellant brusqueness. To the good teacher, the troubles of students are never trivial, but rather are welcome as means to the advancement of his particular interests. Futhermore, I believe that the research ideal imposed on all men trained in the universities is the cause not only of much injury to teaching, but of much unhappiness to teachers. For if the teacher be conscientious, and gives his first strength to his teaching, he is soon doing his research upon the ragged ends of his nerves. I venture to say that many a teacher to-day is wishing he could afford to abandon all attempts at abstract research and turn whole-souled to his teaching and matters connected therewith. And when, indeed, he does so, he finds his happiness and his usefulness alike immensely augmented. I know this is true, for I have been through it. It took me many long years to free myself from the feeling that I must continue research or else sacrifice the good opinion of my colleagues. But I am free, and in the two or three years I have been so the added keenness of my pleasure in my teaching, and in various activities related thereto, has been such as to make me feel like a Sinbad who has dropped his old man of the sea. And if there are any among you who believe that I stay in a society given to research only under false pretenses, I ask you to have patience a little, for I purpose to try to convince the society that its rules ought so to be altered as to make teaching, of approved merit and service, a sufficient qualification for membership. Meanwhile I advise all of my colleagues engaged in collegiate work to join in my declaration of independence. Let us show the universities that teaching hath her victories no less than research.

But now I am going to qualify a little. When I say research I mean abstract research, of the university type, the kind which has place on the skirmish line of the forefront of advancing knowledge. In truth I agree that he is the best teacher who is also an active investigator, but I maintain that in the case of college teachers the investigation ought to have some kind of connection with the teaching. This is entirely possible, for a vast and fruitful field for research lies open in educational organization, in the

introduction of more logical, useful and illuminating topics, experiments and methods, in the fitting of science better to the growing mind, in local floras and the natural history of common plants, in ways for better collation and diffusion of knowledge. After all, it is the spirit of the investigation that is the matter of value to the teacher, not the results. A contemplation of the status of much of the investigation put forth by busy teachers somehow seems to suggest a saying of one of our senior botanists, who was in his youth somewhat of a botanical explorer, and always a genial wit. Apropos of the making of bread in camp he has been heard to remark "it may not result in very good bread, but it's great for cleaning the hands." In investigation as elsewhere, results are most surely and economically won by experts, selected, trained and devoted to that work. The college teacher would do better not to waste his strength on a field in which he can be little better than an amateur, especially when there lies open another in which he can himself be an expert, and that is in educational-scientific investigation.

From this which the university ought not to do, I turn now to things which it leaves undone. It is not giving to those who are to be college teachers certain knowledge and training which are indispensable to good teaching. Thus, it does not insist that they shall know the common facts about the familiar plants around them. The old type of botanical course, consisting in the study of the morphology and identification of the higher plants, is gone forever, not because it was not good, but because the expansion of knowledge has given us something still better. Yet the knowledge involved in the old course is indispensable to every teaching botanist, and I would have a requirement made that no person could be recommended as a competent botanical teacher for a college until he had spent at least two summers of active field work on the critical study of some flora. Again, most of our university-trained teachers know nothing more of the historical or biographical phases of the sciences than they may have picked up incidentally. Yet for purposes of teaching, a knowledge of the history of the science itself, and of its relations to other great matters, is vastly important, in part for the

favorable background it offers for the projection of our present-day knowledge, and in part for the purpose of placing the dramatic, heroic and humanistic aspects of the science at the disposal of the teacher. Again, the teacher may go forth from the university without any other than the most fragmentary knowledge of laboratory administration, although there is a rapidly developing technique of efficient and economical management of laboratory construction, furniture, apparatus, supplies, materials, manipulation; and the lack of any training in these is one reason why our science is so often disgraced, and our influence weakened, by slovenly botanical laboratories. Again, the teacher takes up the instruction of young people without any knowledge whatever of the results, very valuable, all imperfect though they still are, which have been won in the scientific study of the psychology of the adolescent mind. And finally he receives no training in the collation and exposition of scientific knowledge, a subject of such importance that I shall speak of it in a moment apart. Training in investigation he also needs, of course, and that he now gets with ample efficiency. We need a standardization of preparation for college and high-school teaching of the sciences, with appropriate titles or degrees. We are as yet far enough from such a condition, but not wholly without some progress to record. For one university, Chicago, in its school of education, has a department of botany and natural history, administered, by the way, by one of our members and colleagues whose accomplishments in the past give promise of great service to come.

But now once more I wish to qualify a little. While I believe that a training in common knowledge of plants, in the history of our science, in laboratory administration, in the psychology of youth, in the collation and exposition of knowledge, as well as in investigation, is indispensable to the best botanical teaching, and should be included compulsorily in the training of botanical teachers, I do not blame the universities for not providing such instruction, nor am I sure that it is a correct or economical university function. But there is one thing of which I am sure, and it is this, that there is a place in which such training is practicable and wholly appropriate and that place is the graduate department of the college.

Just here I wish to turn aside for a moment to consider a bit more this matter of training in the collation and exposition of knowledge. The expansion of science in our day has been so vast, the literature has become so voluminous, the specialization of method and thought are so extreme, that it is becoming a serious question how the results of new research, when not of a sensational nature, can be quickly, accurately and adequately incorporated into the general mass of our knowledge and made available to the intellectual or economic uses of our race. Every scientific man has witnessed the ignoring of new truth long after its announcement, and the repetition of old error long after its disproval, not alone in popular information and literature, but even in the best scientific text-books; and this mal-adjustment between scientific research and general knowledge waxes constantly greater. The trouble is plain; we have no recognized collators of knowledge, scholars whose business it is to stand between the investigator and the general user of knowledge and to interpret correctly the results of the one to the other. The need for such service was pointed out long ago by Francis Bacon. In his prophecy of the future development of scientific knowledge, veiled under his story of "The New Atlantis," he describes the division of duty among the scholars of Salomon's House. He says:

"Then after divers meetings and consults of our whole number, to consider of the former labours and collections [an obvious prophesy of our scientific meetings], we have three that take care, out of them, to direct new experiments, of a higher light, more penetrating into nature than the former. These we call Lamps. . . : Lastly, we have three that raise the former discoveries by experiments into graeter observations, axioms, and aphorisms. These we call Interpreters of Nature."

To-day we have our lamps, and their light shines steadily and benignantly forth. We call them universities. But where are our interpreters of nature? Though we need them, we have them not. They should be our colleges. In all of the great body of intellectual endeavor there is no greater weakness and no greater opportunity for service, than in the interpretation to all

men of the results secured by research, not in science alone, but in other departments of knowledge as well. It is the absence of such interpreters which leaves room for the charlatans of knowledge, the mendacious reporter who uses his bit of college information to give a specious semblance of truth to his investigations or exaggerations, and the nature fakir whose literary skill is his sole qualification. This interpretation of knowledge is no easy matter. Compilation will not do, for the interpreter must repeat observations and experiments far enough to give him a personal and familiar grasp of the materials. Nor even is a first-hand knowledge of the materials enough; he must also be able to set them forth in exposition with a combination of pedagogical clearness and literary force. So little developed is the interpretation of knowledge in comparison with its acquisition that although we have many strong journals devoted to research we have almost none devoted to interpretation and exposition. We have two or three popular journals, carried on by the devotion of loyal individuals, but with all the conditions for success against them. A suitable journal for the collation, interpretation and diffusion of botanical knowledge can only be conducted by an institution whose credit is involved in its permanence and efficiency. It should be marked by dignified form, artistic dress, and literary grace, with departments covering so completely their fields that no person with a serious interest in the science can possibly afford, and much less be willing, to be without it. Such a journal must of course be heavily subsidized, or endowed, especially at first; but there is not at present any place in the educational structure where an endowment would tell so heavily. It would be worth more to education than the endowment of any professorship that I can think of, even a professorship of botanical education in my own college. Such a journal should issue from a college, not a university. I would like to edit it, and I have the plans worked out in complete detail; but I shall not undertake it unless the business foundation can first be made secure.

Not only does the training of interpreters of nature, and of other knowledge as well, whether as teachers, as writers, through the editing of suitable journals, or other activities, seem wholly

appropriate to a college, but I think it would offer the colleges themselves a mission which would react grandly on their general efficiency. There is an agreement that the first function of the college is the training of young people in the qualities which go to make more effective members of organized human society. But there is also a general feeling that somehow this is not by itself quite sufficient, for while it offers a worthy and amply difficult educational service, it does not provide a sufficiently-absorbing intellectual interest. Our colleges require, for the maintenance of high intellectual tone, both of students and of teachers, some more vigorous intellectual resistance than under-graduates alone can offer. It is in response to this feeling that some colleges have established graduate work, but in all cases, so far as I know, of the investigation or university type. For such work, however, our students should be sent to a university, which can provide far better than any college the facilities, companionship and atmosphere essential to its successful pursuit. To encourage young people, who are never well informed upon these matters and who do not understand the differences between institutions, to come to a college for work of the university type, is little better than attracting them under false pretenses. It would be much better for our educational system if the colleges would do no graduate work at all, unless they can offer something which they can do better than the university. In the training of their own and high-school teachers, and other interpreters of knowledge, they have, from the very nature of their activities and the presence right at hand of the best of all practice schools, a work which they can do better than the university. I hope ere long to see, in one of our greater colleges, the establishment of the first graduate school devoted to the training of these interpreters of knowledge.

But now I have reached the bounds which custom and courtesy allow to a speaker for this kind of address, and although I think with regret of the many large matters I fain would include to make my account of this subject complete, I must come to a close. I shall add but one thing, which is this—a summary of the objects for which we should work.

1. A continuous and adequate system of nature study in the schools, so complete and so good as to send every student into the high schools with no prejudice against science, and with a solid foundation of natural fact knowledge.

2. A four-years' course in the high school in the standard sciences, upon exactly the same basis of efficient teaching and educational dignity as any other subjects whatever, being required in so far as they are required, and elective in so far as they are elective.

3. A system of education in the college which will preserve the golden principle of the elective system—viz., the fact that the mind like the body derives greater good from an exercise in which it can take an interest than from one in which it does not—while pruning away the absurdities that have been allowed to graft themselves thereon. The logical system is the group system, in which the student is free to choose his group, but having once chosen it, finds his studies arranged on a plan approved as wise by educational experience. We must not expect a majority ever to choose the science groups, but those who do should receive a training qualitatively equal to that in any subjects whatever, and, above all, thoroughly but humanistically scientific.

4. A critical review and retesting of our present educational methods and material, with a view to the elimination of the impracticable, the replacement of the mediocre, and the introduction of the better, to be sought through critical educational research.

5. A system of training of teachers which shall recognize that college teachers and university investigators are not one and the same, but fellow craftsmen, entitled to equal honor for equal achievement. The training of the university investigator belongs to the university, but of the college teacher to the college, which should establish the suitable instruction in the practical and humanistic phases of the subject. And since the college teacher is from his profession primarily an interpreter of knowledge, he should make that his particular field; and the colleges should cherish and develop, as their particular function, all activities connected therewith.

These things, I believe, will make the sciences free from their

present educational disabilites. It is true they will not give us perfection. But what is perfection, and who wants it? Perfection, so I fancy, for I never have seen it, is in this like truth, that there is more pleasure in seeking than in finding it. Besides, man, for whom we are doing it all, is imperfect, though the extent thereof depends upon the point from which we view him. If one were to look down upon him from the place of the angels towards which he likes to believe he is ascending, he must seem a very poor creature, deserving only of pity. But if one looks up after him from the place of the beasts from which we know he has risen, then he looms as a very grand figure, worthy of credit and honor. After all, perfect or imperfect, good, bad or indifferent, he is the very best thing of which we are sure. It behooves us, therefore, to make the most of him.

SMITH COLLEGE

NEWS ITEMS

Mr. John Burroughs has recently received an honorary degree, LL.D., from Yale University.

Dr. Ernst A. Bessy, of the Louisiana State University, has been made professor of botany at the Michigan Agricultural College.

Dr. J. E. Kirkwood has been advanced to professor-in-charge of the new department of botany and forestry at the University of Montana.

Professor H. H. Rusby, while continuing his rubber investigations in Mexico, is collecting economic and medicinal material for the New York Botanical Garden.

At the New York Botanical Garden the four o'clock lectures which will be continued into September include the following: "Edible Mushrooms," by W. A. Murrill, August 6; "Influences which Govern Local Distribution of Plants," by Norman Taylor, August 13; "Botanical Cruises among the Bahamas," by Dr. M. A. Howe, August 20; "Grasses and their Economic Importance," by George V. Nash, August 27; "Poisonous Mushrooms," by Dr. W. A. Murrill, September 3; and "European Influences in the History of American Botany," by Dr. J. H. Barnhart, September 10.

TORREYA

August, 1910

Vol. 10 No. 8

ADAM IN EDEN OR NATURE'S PARADISE*

EXTRACTS BY JEAN BROADHURST

Years ago, before the museum building of the New York Botanical Garden was completed, Professor Lucien M. Underwood showed me some of the quaint and rare books in the library. Among them none interested me more than an old herbal written by William Coles and printed "at the Angel in Cornhil near the Royal Exchange in 1657." A. Bronson Alcott says that "the old *herbals*, too, with all their absurdities, are still tempting books", and so I found this one by Coles, which he naively calls Adam in Eden or Nature's Paradise. Since then my guests at the Garden have always been introduced to this time-browned volume with its little, incongruous, gummed label; and the interest shown has suggested the printing of these extracts, that all may have access to an expurgated edition of this rare old book.

Botanists may be interested in the plant descriptions; some are "descriptions which do not describe" and some are strikingly simple and distinctive. How little was generally known of the non-flowering plants is shown by the description of the polypody fern where the sori or fruit dots are ingeniously explained.

The derivation of many of our common words is suggested in such unusual spellings as *wood bind* for *woodbine*, *onely* for *only*, and *then* for *than*; and the rare use of the possessive apostrophe raises a question as to the time of its general introduction into the English language and what spellings may the advocates (and the opponents) of simplified spelling not champion where names are spelled in three ways in one paragraph!

* Illustrated with the aid of the Catherine McManes fund.

[No. 7, Vol. 10, of TORREYA, comprising pages 145-168, was issued Aug. 1, 1910

The general cure-all qualities ascribed to some of the plants suggest a modern patent medicine advertisement; and the recipes call so often for wine and beer as to suggest that then, as to-day, not a little of the invigorating effect was due to the alcohol used.

The book consists of nearly seven hundred pages and contains descriptions of three hundred forty-three plants, which not only cure such human ills as the hichet (hiccough) and the loosening of the teeth, stay hunger, and prevent weariness, but serve various other useful purposes, such as making hens lay, keeping puppies small, and increasing public revenues.

Each plant is described under five headings, the *names,* the *kinds,* the *form,* the *places and time,* and the *virtues* or the *signature and virtues.* By signature, is meant the sign put upon the plant by an all-wise Creator to show man its uses, such as thorns to indicate its thorn- or splinter-drawing power, an ear-shaped leaf to point out its ability to cure deafness, and sticky or slimy juice to show that it should be used to "glue together" cuts and wounds.

The extracts given below include a few of the plants commonly known to-day in America. The aim has been to present for these well-known plants typical descriptions and recipes, preserving so far as possible the leisurely style and naïveté so characteristic of the whole book. Useless repetition has been avoided by the frequent omission of entire sections (such as *names, form,* and *signature*); when part of a section has been omitted it is indicated by asterisks in the usual way.

Other striking differences between Adam in Eden and the books of to-day are the closely-printed title page, lavishly adorned with red ink; the effusive dedication and lengthy introduction, enlivened by several poems dedicated to the author himself; and the conclusion, most naïve of all, where Mr. Coles openly asks for encouragement, laments the lack of time as "a thing I have much wanted ever since I undertook this business", and with a pun bids farewell to the gentle and apprehensive reader.

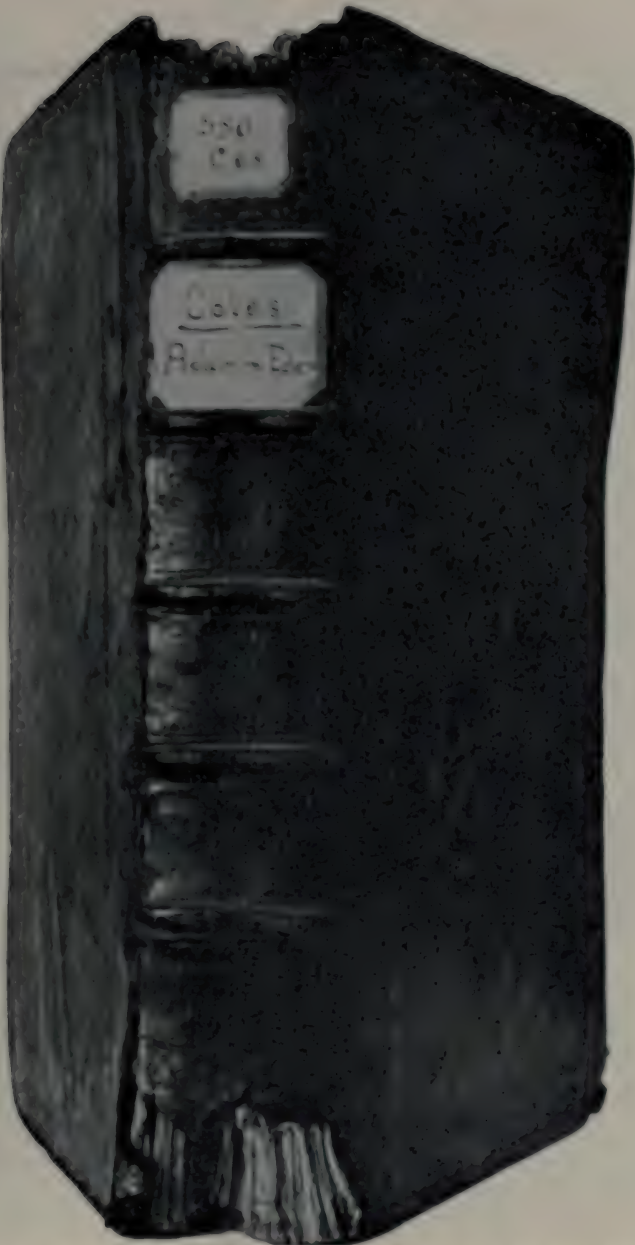


FIG. 1. Photograph of Adam in Eden in the library of the New York Botanical Garden.

ADAM IN *EDEN:* OR, NATURES PARADISE.*

THe Hiſtory of *Plants,* Fruits, Herbs and Flowers. with their ſeveral *Names,* whether *Greek, Latin* or *Engliſh*; the places where they grow; their Deſcreptions and Kinds; their times of flouriſhing and decreaſing; as also their several *Signatures, Anatomical appropriations,* and particular Phyſical Vertues; Together with neceſſary *Observations* on the seaſons of Planting, and gathering of our *English Simples* with Directions how to preserve them in their compositions or otherwise. A *Work* of such a *Refined* and *Uſeful* Method that the Arts of Phyſick and Chirurgerie are ſo clearly laid open, that *Apothecaries, Chirurgions,* and all other ingenuous Practitioners, may from our own Fields and Gardens, beſt agreeing with our *Engliſh* Bodies, on emergent and ſudden occaſions, compleatly furniſh themſelves with cheap, eaſie, and wholſome *Cures* for any part of the body that is ill-affected.

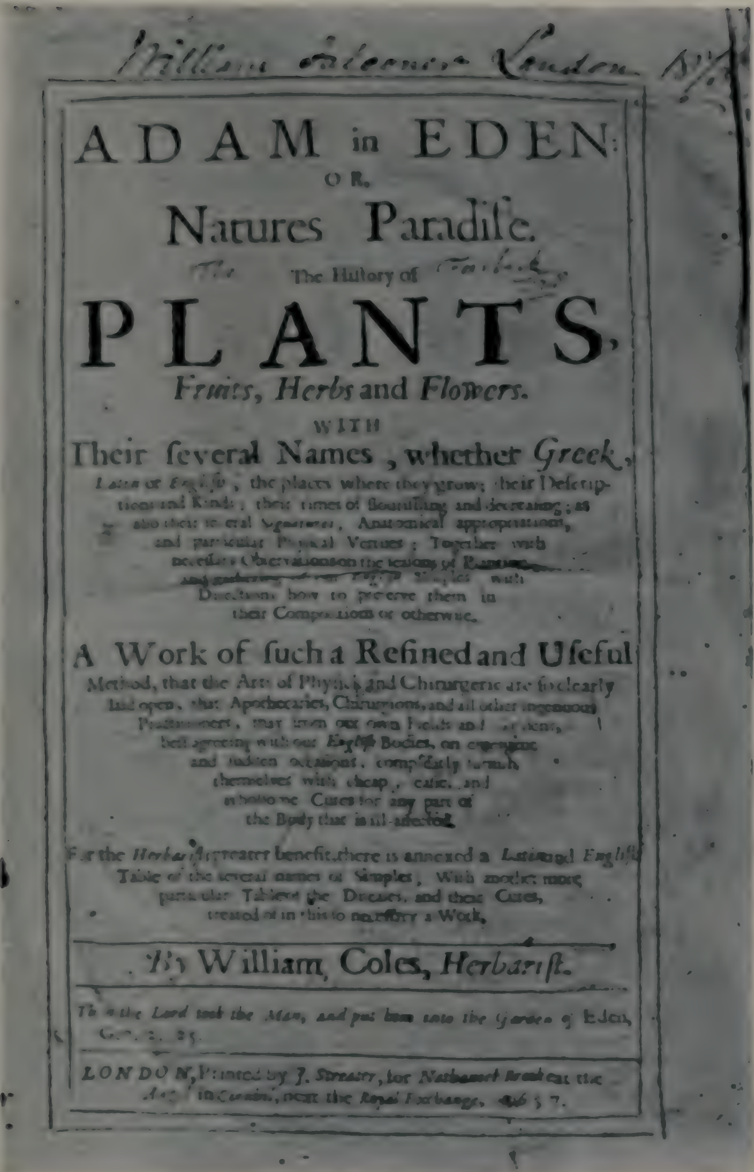
For the *Herbarists* greater benefit, there is annexed a *Latin* and *English Table* of the several names of *Simples;* With another more particular *Table* of the *Difeaſes,* and their *Cures,* treated of in this ſo neceſſary a *Work.*

By *William Coles,* Herbarist.

Then the Lord took the man and put him into the Garden of Eden, Gen. 2. 25.

London, printed by J. Streater, for *Nathaniel Brooke* at the *Angel* in *Cornhil,* near the *Royal Exchange,* 1657.

* The original is in red and black ink; see the illustration on the next page. Permission to make this and the other photographs was given by Professor N. L. Britton, the director of the New York Botanical Garden.



ADAM in EDEN:
OR,
Natures Paradise.
The History of
PLANTS,
Fruits, Herbs and *Flowers.*
WITH
Their several Names, whether *Greek*, *Latin* or *English*; the places where they grow; their Descriptions and Kinds; their times of flourishing and decreasing; as also their several *Signatures*, Anatomical appropriations, and particular Physical Vertues; Together with necessary Observations on the seasons of Planting and gathering of our *English* Simples, with Directions how to preserve them in their Compositions or otherwise.

A Work of such a Refined and Useful Method, that the Arts of Physick and Chirurgerie are so clearly laid open, that Apothecaries, Chirurgions, and all other ingenuous Practitioners, may from our own Fields and Gardens, best agreeing with our *English* Bodies, on emergent and sudden occasions, compleatly furnish themselves with cheap, easie, and wholsome Cures for any part of the Body that is ill-affected.

For the *Herbarists* greater benefit, there is annexed a *Latin* and *English* Table of the several names of Simples, With another more particular Table of the Diseases, and their Cures, treated of in this so necessary a Work.

By William Coles, *Herbarist.*

Then the Lord took the Man, and put him into the Garden of Eden, Gen. 2. 15.

LONDON, Printed by *J. Streater*, for *Nathaniel Brooke* at the *Angel* in *Cornhill*, near the *Royal Exchange*, 1657.

Fig. 2. Title page of Adam in Eden.

To The
TRULY NOBLE,
AND
Perfect Lover Of LEARNING,
Sir William Paston,
Knight and *Baronet.*

Moſt Honoured Sir,

N*Otwithſtanding the generall Dedication of this Herball which you will find at the Foot of my Epiſtle to the Reader, I have thought it abſolutely neceſſary to apply my ſelfe to your Worſhip in Particular, humbly beſeeching you to give me leave to commit it to your more immediate Protection, that in caſe it ſhould meet with any malevolent Spirits, that ſhould have any thoughts to caſt forth their venemous detractions and aſperſions upon it, the Luſter of your name appearing in the Front, might cauſe them to vaniſh, no otherwiſe then the nocturnall spirits doe at the approach of the sunne. That which imboldened me, though a ſtranger to you, to preſume ſo much upon your goodneſſe was the generall repute, that you have really deſerved by thoſe propitious Aſpects, that the nobleneſſe of your Nature hath vouchſafed to caſt upon thoſe, that bend their endeavor towards the advancement of any deſigne tending to the publique good, eſpecially if it be in order to the laudable ſtudy of Phyſick, wherein you have approved your ſelfe a good Patriot, aſ well as by thoſe happy diſcoveries you have communicated to the World; but more eſpecially in that rare cure of the* Gout, *which your Charity hath diſpensed with ſo much ſucceſſe * * * And amongſt the reſt, Students in the Herbary Art are as profitable Members as any other, for beſides that they are Trumpets of Gods glory, ſetting forth itſelfe so wonderfully in theſe Vegetables, they are alſo by ſome called the Handes of God becauſe they are his Inſtruments to apply thoſe things unto Mankind that he hath created for their preſervation. And in this reſpect Phyſick may be ſaid to be more effectual than Divinity it ſelfe, for though the Charmer or Preacher charme never ſo wiſely, yet if the Auditor be not* compos mentis, *but like the Deafe Adder, he will loſe his labour. But ſuch are the Powerfull vertues of Herbs adminiſtered by a skillful Profeſſor, that they will even reſtore thoſe that have loſt their Senſes, and ſo not only make them capable of good Counſell*

and wholſome inſtruction, but cauſe both mind and body to reſume their priſtine Integrity. And thus in all Humility, I lay it down at your Worſhips feet, not without ſome hopes that you will be pleaſed to accept it, and to pardon the boldneſſe of

Sir

Your most humble
Servant,
W. COLES.

To the Reader.

Courteous Reader,

TO make thee truly ſenſible of that happineſſe which Mankind loſt by the Fall of *Adam*, is to render thee an exact *Botanick*, by the knowledge of ſo incomparable a Science as the Art of Simpling, to re-inſtate thee into another *Eden*, or, *A Garden of Paradiſe* * * * for I dare boldly aſſert, that if there be any one that is become ſo much an Herbariſt, as to be delighted with the pleaſant Aſpects of Nature, so as to have walked a few turns in her ſolitary Places, traced her Allies, viewed her ſeverall imbroidered Beds, recreated and feaſted himſelf with her Fragrances, the harmleſſe delights of her Fields and Gardens; He it is, that hath embraced one of the greateſt of terreſtriall Felicities. Hence, it is, that Emperours, Princes, Heroes, and Perſons of the moſt generous Qualifications, have trod on their Scepters, ſleighted their Thrones, caſt away their Purples, and laid aſide all other exuberancies of State, to court their Mother Earth in her own Dreſſings; Such Beauties there are to be diſcerned in Flowers, ſuch Curioſities of Features to be found in Plants. When God Almighty would have *Adam* to partake of a perfection of happineſſe, even then when he ſtood innocent, he could find none greater under the Sun then to place him in a Garden. * * * With my Prayers for the proſperity of the Nations, together with my beſt deſires for the good ſucceſſe of mine Endeavours, I take

Leave and rest. Thine,
W. COLES.

To Th' *Ingeniously Learned*, Mr W. Coles,

on this *His* worthy *Labour*, intituled, *The Paradise of Plants*, or, *Adam in Eden*.

Sir, My *Affection*, not my Avarice,
Hath made *m'Intrude* into your *Paradiſe*:
Where, to amazement, I have gladly seen
Earth's fairest *Beauties*, dresſed in Lovely-green:

So *glorious,* so full of *Eloquence,*
They both *surprize,* and *captivate* the *Sense*
So *Ravishing,* I cease to wonder more
Why *Dioclefion,* the *Emperour,*
Put off his *purple,* and *resigned* up all,
To lead his *Life,* within a *Garden-Wall:*
So *various,* as if they meant to *Vie*
Their different *Faces,* with *Humanitie:*
So *Numerous,* we'd think the *Heav'nly-Scheme,*
Had not a Parent, for Each *Plant* of them;
(Whereas, though *Earth* their Common Mother be,
They All from *Heav'n,* derive a pedigree.)
But O their vertues! Thofe do strike one *Mute*
Th'are pas *exprefsion, some, paft finding out:*
Or peftered with an inconvenience, which
Makes Him that *knows 'em* but a *knowing-witch*
And that's one Reason th'are so clofely hid,
(*Nature's* whole *System* so inveloped)
And we (*Poor Mortalls*) thus exposed to trie
Endleffe Conclusions for their Energie.
Nor shoulde w'm any measure, this attain;
But that some Vocal *Signatures,* explain
The end of their *Production,* and *Restore*
To us, in part, what *Adam* knew before
In which grave work, a number have *done well*
But very few, had fortune to *excell:*
And those that did, the Anciens greatly Priz'd,
Rewarded high, nay, sometime *Idoliz'd*
* * * But now! what shall we say
What owe we to You, that we have *Smooth'd the Way,*
And *cut it shorter,* by whole shelv's of Books,
That serve, but to *confound* 'em Overlooks
Their *Bulkie Vol'ms?* So Methodiz'd the Art,
That now 'tis Apposite Man's ev'ry Part
Whose *Triple Regions* have their *Plants* at hand,
His *Limbs,* their proper Med'cines, at command.
* * * I could (almost)
Believe *the Wise*-man's *Books* were never *Lost,*
(Such is *Knowledge,* doth from hence accrew!)
Or (were they so) I'm fure th'are found in you.
Go on (Brave Soul!) and *Perfect* this *Design,*
Whil'st we *confpire,* to make *your* glory fhine;
And (with *Respect* to *Learning*) fancy still
That *Colts* hath writ, as *faer* as any *Quill*

S. Wharton.

TO

His Eſteemed, William Coles, *upon his New Methodized Hiſtory of* PLANTS.

SOme may condemn your forwardneſſe, that you
Venture thus ſoon into the publick view;
But by the wiſeſt ſort 'tis underſtood,
No man can be too haſty to do good.
And may all thoſe that enviouſly do brouze
Upon your Leaves, fare like the Vicars * Cowes;
The fault will be their own, yet ſtill 'tis true,
In *Yew* there's poyſon, though there's none in You:
For you have ſcrutiniz'd Dame-Natures ſtore,
To find out Remedies, that may reſtore
Expiring Health, when the cold Hand of Death,
Is ready to extort our vitall breath.
And as Diſeaſes craftily do part
Themſelves in Squadrons; ſome invade the heart,
Others the Head ſurpriſe; and others ſtrive
If not to kill, to make Us dye alive.
So you your Plot ingeniouſly have laid,
To raiſe ſtout Forces with ſmall Charges paid,
To charge their ſeverall Parties in each part,
And Nature marches Hand in hand with Art.
Kind Nature alwayes hath held forth her Book.
But few have thought it worth their pains to look
Within thoſe precious Leaves, wherein each cure
Is plainly legible in *Signature*.
You have reviv'd that Knowledge, and by Her,
You will be thought her beſt *Interpreter*.
Ile ſay no more; your Books themſelves will praiſe,
And every Garden yield you verdant *Bayes*;
And they that find the good, with all their Souls,
Will wiſh *New-Caſtle* may ſend all ſuch *Coles*.

*See the Art of Simpling, Chap. 19.

Anthracius Botanophilus.

TO

Fig. 3. A sample poetical tribute.

A Table of the *Appropriations,** ſhewing for what Part every *Plant* is chiefly medicinable throughout the whole Body of Man; beginning with the *Head;* quoted according to the chapters contained in this Book.

For the Head in generall.		For the Eares.		For the Teeth.	
Wallnuts,	1	Aſarobacca.	25	Pine,	51
Peony,	2	Ground Ivy,	26	Pomegranate,	52
Poppy,	3	Ivy,	27	Maſtick,	53
Squills.	4	Poplar-Tree,	28	Maſter-work,	54
Larch Tree its Agarick and Turpentine.	5	Nightſhade,	29	Corall	55
		Sow-ſennell,	30	Corall-wort	56
		Sow-thistles,	31	Henbane,	58
				Wild Tanſy,	59

For restoring Hair.		For the Mouth in generall.		For the Dryneſſe of the Mouth.	
Quinces,	14	Medlars,	41	Fleawort,	60
Moſſe,	15	Mulberries,	42		
Maidenhare,	16	Mints,	43	**For the diſeases of the Throat, as Roughneſs, Quinſy, Kings Evill, &c.**	
		Purſlane,	44	Throatwort,	61
		Golden Rod,	45	Date-tree,	62
				Garlick,	72
				Liquorice, &c.	73

ADAM in EDEN

OR,

The Paradise of Plants

THe Method which I ſhall follow in this enſuing Treatiſe, ſhall be according to that which Anatomiſts uſe in Mans body, which they divide into four parts, viz. *The upper middle, and lower Regions; and lastly, the Limbs. Firſt treating of thoſe plants which are appropriated to the Head, and to the ſeverall parts thereof. Secondly, of thoſe which*

* These are selections only from the first page of the Table of Appropriations. Other "Appropriations" not given in this selection are: For the Eyes, For the Brain, For the Nose, For the Scurvey, For ſhortness of Breath, For the Heart, Qualms, Faintneſſe, &c., For cooling and ſtrengthening the Stomack, For the Liver, For the Spleen, and For drawing out Splinters.

are appropriated to the Breast, and the parts therein contained. Thirdly, of those which do more properly appertain to the ABDOMEN *or lower Region. And fourthly, of those which particularly belong to the Limbs. In all when I shall observe those* PLANTS *which have any special Signature; And I shall begin the Wall-nut-Tree, because the fruit of it doth resemble the Head in severall particulars.*

CHAP. I.

Of the Wall-nut Tree.

ALthough the Wall-nut-Tree is generally known to most sorts, yet lest, in this respect, our *Treatise* should seem lame, I shall take pains to describe the form of it; but first I shall give you the Names and Kinds as I find them spoken of, both by the Ancient and Modern Botanicks.

The Kinds

Parkinson and others reckon up eight kinds thereof: 1. Our ordinary Wall-nut. 2. The greatest Wall-nut. 3. The thin-shelled Wall-nut. 4. The long Wall-nut. 5. The Wall-nut which beareth twice a year. 6. *St. Johns* Walnut, or the late-ripe Wall-nut, which shooteth not forth any leaves, till it be Midsummer. 7. The white Wall-nut of *Virginia*. 8. The black Wall-nut of *Virginia*. But because all these kinds differ little in their vertue, I will describe none here but the ordinary Wall-nut.

The Forme.

The *Wall-nut* is a lusty Tree both for height and bulk, and spreadeth forth many large Arms and Boughs, and must make a goodly shadow, when the leaves are on, which consist of five or six fastened to one rib, with one standing on the top, like those of the Ash, but that they are much larger: . . . It beareth catkins or Aglets, which come forth before the nuts, of a yellowish colour, which open into small flowers, and falling away, the round Nuts come in their places, two or three usually set together; but some times half a dozen or more, which are covered with a double shell; . . . Of the whole fruit growing on the Tree, there is this common old Riddle, which almost every child can say. Its

As high as an House, As little as a Mouse;
As round as a Ball, As bitter as Gall;
As white as Milk, As soft as Silk.

The Wood is much used by Joyners, to make Tables, Stools &c. It is very durable if it be kept dry, but rots presently in the weather.

1

ADAM in EDEN:

OR,

The Paradise of Plants.

THe Method which I shall follow in this ensuing Treatise, *shall be according to that which Anatomists use in Mans body, which they divide into four parts,* viz. *The upper, middle, and lower Regions; and lastly, the Limbs. First treating of those Plants which are appropriated to the Head, and to the severall parts thereof. Secondly, of those which are appropriated to the Breast, and the parts therein contained. Thirdly, of those which do more properly appertain to the* Abdomen *or lower Region. And fourthly, of those which particularly belong to the Limbs. In all which I shall observe those* Plants *which have any special Signature; And I shall begin with the* Wall-nut-Tree, *because the fruit of it doth resemble the Head in severall particulars.*

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The Names.

It is called by *Dioscorides* and the other Ancient Greeks, **Καρύα**, because they say the smell of the Leaves causeth the Head-ach, deriving it from **Κάρα** or **Κάρη**, which in that Language signifieth an *Head*; and it hath sometimes the Epithite **Βασιλικὰ** adjoyned, because it was brought out of *Persia* into *Greece* by some of the *Gracian* Kings. It is called also by some of the Modern Greeks, **Διὸς βάλανος**, *Jovis glans*, and so the Latines from them *Dii-glans*, by contracting the word, and substracting the first Letter they called it *Juglans*. We English, call it the *Wall-nut-Tree*; and of some, *Walsh-nut-Tree*. The Nut is called in Greek **Κάρυον βασιλικὸν**; in English, *Wall-nut*; In Latine, *Juglans* & *Nux* **κατ' ἐξοχὴν**.

The Kinds.

Parkinson and others reckon up eight Kinds thereof: 1. Our ordinary Wall-nut. 2. The greatest Wall-nut. 3. The thin-shelled Wall-nut. 4. The

B Long

Fig. 4. The first descriptive page.

The *Place* and *Time*

The place of its first Nativity was in Persia, whence either the whole Tree hath been brought into divers other parts, or else the Nuts, which being put into the ground, do produce the Tree: for there is no other way of propagating it, unless it be of the *Virginian kinds*. It groweth commonly in *England* and some other places, in Orchards, Gardens, and sometimes in the streets and by the way sides where the Boys be continually pelting at them. There is a Fable in *Æsop* of a woman which asked the Wall-nut-Tree growing by the way side, which was pelted at with stones and sticks, by them that passed by, why it was so foolish to bring forth fruit, seeing that it was so beaten for its pains, to which the Tree rehearsed these two Proverbial Verses: * * * The *English* whereof I could tell you but that I fear the women of this preposterous age would be angry.* True it is, that this Tree, the more it is beaten, the more Nuts it bears; and therefore good Husbands, after they have beaten down the Nuts, do with long Poles, beat the empty boughs of the Tree; and I have observed, that those Trees which have grown in the streets, have been full, when those which have growen in the back have had scarce any, which I could impute to nothing else. * * *

The *Signatures* and *Vertues*.

Wall-nuts have the perfect Signature of the Head: The outer husk or green Covering, represent the * * * outward skin of the skull, whereon the hair groweth, and therefore salt made of those husks or barks, are exceeding good for wounds in the head. * * * The *Kernel* hath the very figure of the Brain, and therefore it is very profitable for the Brain, and resists Poysons; For if the kernel be bruised, * * * and laid upon the Crown of the Head, it comforts the brain and head mightily.† * * * And true it is, that two dry Wall-nuts, and as many Figs, and twenty leaves of Rue, bruised and beaten together, with two or three Corns of salt were King *Mithridates* Medicine against poyson, which after he had long used daily, at last he sought to poyson himself, but could not. And no marvel for the water of green Wall-nuts, taken about Midsummer, being drunk two or three ounces, cooleth and resisteth the Pestilence. * * * A peece of the green husk, put into an hollow Tooth, easeth the pains thereof. Some use the green husks * * * to season their meat; but if some dryed Sage in Pouder be put into it, it will give a seasoning and relish not to be despised of poor folks. The Oyl of Wall-nuts * * * maketh smooth the hands and face, and taketh away * * * black and blew marks that come of blows and bruises, * * *. It is averred by some that if a Wallnut be * * * put into a chicken, it will caus it to be roasted a great deal the sooner.

* Translated popularly they are:

A woman, a donkey, and a walnut tree,
The more they're beaten, the better they be.

† "Very good" was written in pencil on the margin opposite this sentence.

long Wall-nut. 5. The Wall-nut which beareth twice in a year. 6. *St. Johns* Wall-nut, or the late-ripe Wall-nut, which ſhooteth not forth any leaves, till it be Midſummer. 7. The white Wall-nut of *Virginia*. 8. The black Wall-nut of *Virginia*. But becauſe all theſe kinds differ little in their vertue, I will deſcribe here none but the ordinary Wall-nut.

The Forme.

The *Wall-nut* is a luſty Tree both for height and bulk, and ſpreadeth forth many large Arms and Boughs, and muſt make a goodly ſhadow, when the leaves are on, which conſiſt of five or ſix faſtned to one rib, with one ſtanding on the top, like thoſe of the Aſh, but that they are much larger: the bark is ſomewhat green in the younger boughs; but in the Trunk, it is tending to the colour of Aſhes, and is full of clefts for the moſt part; It beareth Catkins or Aglets, which come forth before the Nuts, of a yellowiſh colour, which open into ſmall flowers, and falling away, the round Nuts come in their places, two or three uſually ſet together; but ſometimes half a dozen or more, which are covered with a double ſhell; the outermoſt, green, ſoft, thick, of a ſtrong ſmell, the juice colouring black; under which there is a wooddy ſhell, wherein a white ſweet *Kernel* is contained, encloſed with a yellowiſh, bitter peeling, which commeth off eaſily while it is freſh, but will not do ſo when it is old: the inner pulp thereof is white, ſweet, and pleaſant to the taſt, when it is newly gathered; for after it is dry it becommeth oily and rank. Of the whole fruit growing on the Tree, there is this common old Riddle, which almoſt every Child can ſay. Its

As high as an Houſe, As little as a Mouſe;
As round as a Ball, As bitter as Gall;
As white as Milk, As ſoft as Silk.

The Wood is much uſed by Joyners, to make Tables, Stools, *&c.* It is very durable if it be kept dry, but rots preſently in the weather.

The *Place* and *Time*.

The place of its firſt Nativity was in *Perſia*, whence either the whole Tree hath been brought into divers other parts, or elſe the Nuts, which being put into the ground, do produce the Tree; for there is no other way of propagating it, unleſſe it be of the *Virginian kinds*. It groweth commonly in *England*, and ſome other places, in Orchards, Gardens, and ſometimes in the ſtreets and by the way ſides, where the Boys lie continually pelting at them. There is a Fable in *Æſop*, of a Woman which asked the Wall-nut-Tree, growing by the way ſide, which was pelted at with ſtones and ſticks, by them that paſſed by, Why it was ſo fooliſh as to bring forth fruit, ſeeing that it was ſo beaten for its pains, to which the Tree rehearſed theſe two Proverbiall Verſes:

Nux, Aſinus, Mulier, ſimili ſunt lege ligati
Hac tria nil rectè faciunt, ſi verbera ceſſent.

The *Engliſh* whereof I could tell you, but that I fear the Women of this prepoſterous Age would be angry. True it is, that this Tree, the more it is beaten, the more Nuts it bears; and therefore good Husbands, after they have beaten down the Nuts, do with long Poles, beat the empty boughs of the Tree; and I have obſerved, that thoſe Trees which have grown in the ſtreets, have been full, when thoſe which have growen in the back ſides have had ſcarce any, which I could impute to nothing elſe, but that thoſe in the ſtreet were beaten and throwen at, more then the other: they bloſſom early before the leaves come forth, and the fruit is ripe in *September*, except St. *Johns Wall-nut*, which ripeneth not till *October*.

The

FIG. 5. The second descriptive page.

CHAP. II

Of the Piony.

The *Kindes.*

THe Sorts of *Pionyes* which I have met with, are in number 11. 1. The male *Piony.* 2. The Female *Piony.* 3. Double Red Piony. 4. The double white Pyony. 5 The Spanish Dwarf Piony. 6 Columbine leafed Pyony. 7. The party coloured Piony. 8. The female white Piony. 9. The female yellow Piony. 10 The doubtful female Piony. 11. Certain, single, and double female Pionies, that sprang with Clusius, of the seed of the double Red, which is not usual. All these sorts, except the female, are Plants so scarce, that they are possessed but by a few, and those great Lovers of Rarities in this kinde and therefore I shall trouble you onely with the description of that.

The *Forme.*

The . . . *Piony* riseth up with many stalks, ... At the top of the stalks, are growing fair large red flours, like the great double Rose of Provence; but that it is of a darker red, having also in the midst, yellow *Threds* or *Thrums* like them in the Rose, which some take to be the seed though falsely, which being faded and fallen away, there come in their places, two, three, or four rough crooked *Pods*, bending a contrary way, as some Rams Horns do.

The *Signature* and *Vertues.*

The Heads of the Flower of *Piony*, being not yet blown, have some Signature and proportion with the Head of man, having sutures and little vains dispersed up and down like unto those which environ the brain, . . . the Roots are most effectuall; for if they be fresh taken up and hung about the neck of children they cure it [Falling-sicknesse]; but the surest way both for them, and especially those which are elder is to take the roots . . . and infuse it in a sufficient proportion of Sack, for four and twenty hours at least, being first washed clean, and stamped very small, then strain it, and drink a good draught first and last, morning and evening, for severall dayes together, before and after the full of the moon; . . . The distilled water, or Syrup, made of the flowers, worketh the same effect that the Root and Seed do, though more weakly. Take the roots of *Piony*, and peel off the outward skins: take also Periwinckle leaves, stamp and strain them into black Cherry-water, and let the Patient for three mornings fasting, drink a good draught thereof: but if he mend not at three times, let him drink longer. This Receit was approved by the Lady *Gage.*

CHAP. III.

Of Poppie

The *Names.*

THe general name * * * in plain *English* is, Because it doth ſo ſtupifie thoſe that eat it, that they can not go about their buſineſſe, or becauſe the uſe of it doth * * * at length make men inſenſible.

The *Kindes*

There be ſeverall ſorts of *Poppies,* some tame and of the garden as 1. The white garden Poppy * * * 3. Little red Poppy or Corn-rose* * * * 5 Murry coloured Poppy. * * *

The *Forme.*

Spatling Poppy * * * hath divers weak tender stalks, full of joynts, about a foot or half a yard long, uſually lying on the ground, whereon grow many pale whitiſh green leaves, two always ſet together at the joynts, one againſt another; * * * at the tops of the ſtalks upon many ſlender foot-ſtalks, ſtand divers white flowers, composed of five small leaves apeece, with a deep notch in the middle of every one of them * * *.

The *Signature and Vertues.*

The Heads of the Poppies with their crowns do ſomewhat repreſent the Head and Brain, and therefore the decoctions of them are uſed with good succeſſe in ſeveral diſeaſes of the Head. The Garden Poppy Heads with the seeds, made into a Syrup, procureth rest and ſleep in the ſick and weak, * * * Mr. *Culpepper* ſaith, that it is the juyce of the white Poppy growing in *England,* which they sell for *Opium* in the Shops, though they pretend to have it out of the Eaſtern Countries, where they gather it only from the heads of the great white Poppy; but certainly his Pen run before his Wit, when he ſaid it grew beyond the moon: for there is no queſtion, but that it is ſo gathered in thoſe parts * * * It was the head of this Poppy which the Greeks * * * [thought] to foreſhew, as they conceived, the ſucceſs of their love: For theſe Flowers, the tops being cloſed together with ones fingers, ſeem like little Bladders, which being broken againſt ones other hand, make a noiſe like unto the Bladders of little Fiſhes, being broken: If they gave a good report, they concluded they ſhould be ſucceſſful; if not, they preſently let fall their suit: so ſuperſtitious were thoſe people, as ſome in our own dayes be. * * *

* The common poppy of the wheat or "corn" fields, doubtless.

CHAP. VII

Of Sage.

The *Signature* and *Vertues.*

THe leaves of sage which look as if they were ſcorched by blaſting, do by Signature give help to thoſe parts of a mans body that seem to be as it were dead by ſome blaſting, in reſtoring the natural heat and vigour to the part: in which quality it excelleth, giving a friendly and beneficial Comfort to the Vital Spirits. This herb hath many rare properties, but three eſpecially which are contained in the following Verſes.

Sage helps the Nerves, and, by its powerfull might,
Palſies and Feavers ſharp it puts to flight.

Sage is of excellent good uſe also, to help the memory by warming and quickening the Sences, and the Conserve made of the flowers is uſed to the ſame purpoſe: The eating of Sage in the moneth of *May* with Butter, Parſly, and ſome ſalt is very commendable for the continuation of health to the Body; . . .

CHAP. VIII

Of Rosemary

The *Place* and *Time*

THe ordinary Roſemary, as alſo that with the gilded Leaves are no Strangers here in *England*, for they are to be found in most gardens, though their natural ſoil be in *France*, *Spain*, and other hot Countries. In that part of *France* which is called *Provence*, it groweth of itſelf without ſetting, and is uſed for a common fuel. There is so great plenty of it likewiſe, in *Spain*, that the Odour of it, is many times ſmelt by thoſe in the Ships that paſſe by, many leagues off from the Land. . . .

The *Vertues*

. . . The Chymicall Oyl drawn from the Leaves and flowers is a Soveraign help for all the diſeaſes aforeſaid, if the Temples and Noſtrills be but touched with a drop or two, it helpeth the head and brain, and ſo it doth any cold-benummed Joynt, Sinew, or member, . . .

CHAP. XII

Of the Lilly *of the* Vally

The Kinds.

OF this Lilly I find but two sorts. 1. Lilly-Convally with white flowers. 2 Lilly-Convally with red flowers.

The *Forme,*

The Lilly of the Valley hath leaves, ſomewhat like unto other white Lillies, or rather like unto the leaves of the ſmallest water Plantains, among which doth a ſlender and ſmall ſtalk ſpring up; in the top of which grow forth little ſsmall white flowers, like little bells, with turned edges, and of a pleaſant ſmell; which being paſt there come ſmall red berries, much like the berries of *Aſparagus;* wherein the ſeed is contained. The root is ſmall and ſlender, creeping farre abroad in the ground.

The Temperature and *Vertues.*

The Lillies of the Valley * * * ſtops the paſſages of the Leproſy beginning that the ſame ſpread no further abroad. * * The water alſo aſſwageth the swellings of the stingings of Bee and Waſps, if it be applyed to the part. * * * The wine is more precious than Gold; for if any one that is troubled with the *Apoplexy* drink thereof, with ſix grains of Pepper, and a little Lavander water, they ſhall not need to fear it that moneth; * * * Six ounces of the water of the flowers, helpeth thoſe that are poyſoned or bit with a mad dog, and being drunk fourty daies, it doth away the falling Sckneſſe. * * * *Gerard* ſaith, That a glaſſe being filled with the flowers of *May* Lillies, and ſet in an Ant-hill with the mouth cloſe ſtopped for a months ſpace, and then taken out, you ſhall find a Liquor in the Glaſſe, which being outwardly applyed helps the Gout very much.

(*To be continued.*)

A NEW TERRESTRIAL ORCHID

In November, 1903, during an excursion to the vicinity of Camp Longview in the southern end of the Everglades, Mr. J. J. Carter, Mr. A. A. Eaton, and the writer discovered a peculiar orchid in the pine woods along the trail about two miles northeast of the point where the trail crosses Long Prairie. The plant was first observed by Mr. Carter, and only two plants were found.

The material was divided and one part sent to Mr. Oakes Ames' Botanical Laboratory, while the other was sent to the New York Botanical Garden, with the hope that the specimens might continue to grow and flower in one or both of these institutions, as the plants found had well developed buds, but no open flowers. Unfortunately both specimens were damaged by cold weather before they reached their destinations, and they both died. Fortunately, however, the best plants were sent to Mr. Ames who made careful camera lucida drawings of the parts of the flower-bud. Mr. Ames tentatively referred the plants to *Tetramicra Eulophiae* Reichenb. f. in a paper published in the Proceedings of the Biological Society of Washington **19**: 2. 1906.

In September of the following year, 1904, Mrs. Britton collected specimens of the same orchid on New Providence, Bahamas; and the dissections, and the field notes made by Dr. Britton, correspond almost exactly with the dissections and notes made by Mr. Ames.

Mr. Eaton's continued exploration of the Everglade Keys in 1903 and Mr. Carter's and the writer's further exploration of that region in 1904 failed to reveal further specimens, although diligent search was made. However, while we were in the pine woods in the vicinity of Long Prairie in October, 1906, Mr. Carter again found two plants at a point about two miles south of the locality where he discovered similar plants in 1903.

Further study of the plant proves it to be a complete novelty. I take pleasure in naming it for Mr. J. J. Carter, of Pleasant Grove, Pennsylvania, who was the first one known to lay eyes on it.

Carteria gen. nov.

Caulescent herbs with clustered fleshy tubers and erect simple stems. Leaves various, the basal ones firm, narrow, with plicate blades, the cauline ones mere sheathing scales. Flowers several, erect, axillary to scale-like bracts. Perianth colored. Sepals nearly equal, narrow, longer than the petals. Petals decidedly narrower than the sepals. Lip short, sessile, slightly 3-lobed at the apex, with the middle lobe much longer than the lateral ones, the body with 5 longitudinal crests. Capsules erect.

Carteria corallicola sp. nov.

Stems 2–3.5 dm. tall, rather slender, fleshy: basal leaves 2–7 cm. long; blades nearly linear, narrowed at both ends, often curved: spike of flowers rather inconspicuous, erect: lateral sepals linear-lanceolate to broadly linear, 6.5–7.5 mm. long, green or greenish-yellow: petals linear or nearly so, yellowish-green or greenish-white: lip oval to orbicular-oval, 6–7 mm. long, the body yellowish, with the crests extending to the base of the middle lobe, the lobes magenta, or magenta-pink at the tips: anther magenta: mature fruit not seen.

In pinelands, Everglade Keys, Florida. Also in the Bahamas. Type collected about two miles northeast of the point where the old trail crosses Long Prairie, October 31, 1906, J. K. Small, J. J. Carter, A. A. Eaton.

Carteria is related to *Triphora*, but differs in the position of the flowers, and the lip, as described above, and in the short column, the prominently 3-lobed stigma which is thick and spongy at the base, and the inconspicuous anther-connective.

J. K. SMALL

REVIEWS

Collins' The Green Algae of North America *

American students of the fresh-water algae and of the marine Chlorophyceae have welcomed the appearance of Collins' descriptive work on the green algae of North America, which treatise they have now been able to put to a practical test for about a year. This dignified book of four hundred octavo pages and eighteen plates begins with an Introduction, in which are discussed the scope of the work, the present status of our knowledge of this group of plants, and methods of collecting, preserving, and studying the algae. The author has used the term "green algae" in the broad familiar sense, instead of trying to make it conterminous with the "Chlorophyceae" of most modern authors. However, the Desmidiaceae are omitted as constituting a proper specialty of their own on account of their numbers and peculiar characters and the Characeae are left out owing to their slight affinities with the green algae in the narrower sense. The class Heterokontae, proposed by Luther in 1899 and adopted a little

* Collins, Frank Shipley. The Green Algae of North America. Tufts College Studies (Scientific Series) **2**: 79–480. *pl. 1–18*. Jl 1909.

later by Bohlin, Blackman and Tansley, West, and Oltmanns, has been accepted as a group coordinate with the Chlorophyceae, though the author has followed Luther, and Oltmanns, in keeping the Vaucheriaceae in the Chlorophyceae rather than Bohlin, and Blackman and Tansley, in transferring them to the Heterokontae. The Flagellates are excluded and the Conjugatae find themselves again under the Chlorophyceae, as with West.

Keys to the families, genera, and species add much to the working value of the book, as do, also, the one hundred and sixty good figures illustrating most of the principal genera. References to the more important literature and to exsiccatae assist the reader to further information as to points of special or critical interest.

A carping critic might find now and then in Mr. Collins' work a few features to mention unfavorably, but that would doubtless be more or less true of every book of the sort that was ever published or that ever will be published. Some of the keys to the species, notably that to the species *Penicillus*, omit the more distinctive and diagnostic specific characters or translocate them in such a way that the student would be often misled in an attempt to determine species by their aid. *Rhipocephalus oblongus* (Decaisne) Kützing, known only from the Bahamas, is omitted altogether. This is evidently a distinct species, often much resembling *Penicillus capitatus* in habit and much weakening the generic distinction of *Rhipocephalus* from *Penicillus*. And there are in the work slips and inaccuracies of a less important character, such as the accidental attributing of figure 148 (*Acicularia Schenckii*) to Börgesen rather than to the present reviewer. But occasional omissions and lapses are of course inevitable in a work of the size and scope of the present one. In bringing together in a single volume and in the English language the descriptions of the green algae of North America, Mr. Collins has done much to stimulate and facilitate the study of this interesting group of plants and American students of the algae will not be slow in acknowledging their great indebtedness to him.

MARSHALL A. HOWE

OF INTEREST TO TEACHERS

Biological Geography

Under this heading the Association of American Geographers, at the Boston meeting in December, tabulated the following statements for part of the discussion at the round table conference on the organic side of geography, its nature and limits:

The factors of a plant habitat are all more or less geographical, but the investigation of some, such as light, pressure, polarity and gravity belongs in high degree to the expert in structural and physiological botany.

The relation of plants to other factors, as water, is of the highest importance to the geographer and offers a common field of investigation.

It makes small difference who does this work, and whether he is called a botanist, an ecologist, a geographer, a geographical botanist, or a botanical geographer.

In any case the results are available both to the botanical expert and to the geographer for their special purposes.

The distribution of animals is zoö-geographical. The investigator may be a geographer or a zoölogist, or both combined.

Insect and germ life in relation to public health, both in tropical and temperate regions, require medical, biological, and geographic experience in the investigator. The subject therefore has a place in geographic investigation and education.

Animal life is related to agriculture and to food. Commercial geography should go further in recognizing advances in animal industry, and in taking account of importations, game protection and the control of disease.

The student who is more zoölogist and less geographer or more geographer and less zoölogist would be capable of certain work, but the investigator must have training in both fields.

The aims they state are practical rather than theoretical, and directed toward securing the best available conception of the earth and its life which is possible to the present generation.

NEWS ITEMS

Fred MacAllister has been appointed instructor in botany at Cornell University.

At Northwestern University William Logan Woodburn has been appointed instructor in botany.

Dr. R. M. Harper is continuing his work on the peat deposits of Florida for the State Geological Survey.

Charles H. Shattuck (Ph.D., Chicago) has been appointed professor of forestry in the University of Idaho.

Professor H. A. Edson, of the University of Vermont, has accepted a position with the Bureau of Plant Industry.

Lord Strathcona, the chancellor of Edinburgh University, has given $50,000 to endow a chair of agriculture in that institution.

Prof. C. Stuart Gager, director of the new Brooklyn Botanic Garden, has joined Dr. N. L. Britton, director-in-chief of the New York Botanical Garden, on his Cuban exploration trip.

H. S. Jackson, assistant in plant pathology at the Oregon Agricultural Experiment Station, has been appointed professor of botany and plant pathology at the Oregon Agricultural College.

J. B. Carruthers, assistant director of agriculture at Trinidad, died in July. Mr. Carruthers formerly held similar positions in Ceylon and with the Federated Malay States.

Warren C. Norton has been made assistant in botany at the North Carolina College of Agricultural and Mechanical Arts; B. B. Higgins, of that institution, has been made assistant at Cornell University.

Dr. Charles Hugh Shaw, formerly professor of botany at Temple College, Medico-Chirurgical College (Philadelphia), and Ursinus College, and assistant professor in the University of Pennsylvania, was drowned August 8 near Revelstoke, British Columbia. Dr. Shaw has for several seasons conducted botanical expeditions into the Selkirks.

Five research fellowships in the Henry Shaw School of Botany, each carrying an allowance of $500 per year, have been estab-

lished through the action of the trustees of the Missouri Botanical Garden ; they are to be known as the Rufus J. Lockland research fellowships, in honor of the late president of the board.

Edward W. Berry, of the Johns Hopkins University, will spend September and October in collecting fossil plants from the Cretaceous and Tertiary of the Gulf region from Florida to Louisiana, and northward through Arkansas, Tennessee and Kentucky. It is hoped that these collections will have an important bearing upon the correlation of the containing deposits and will serve as a basis for subsequent monographic studies.

TORREYA

September, 1910

Vol. 10 No. 9

POTENTILLAE OF THE ARCTIC-ALPINE ZONE ON PIKE'S PEAK

Five species of *Potentilla*, with their near relative *Dasiphora fruticosa*, appear within this zone on Pike's Peak.

P. saximontana Rydb. is by far the most abundant and conspicuous. It occurs everywhere and exhibits many variations of habit due to its environment. Ordinarily of a caespitose habit, in well-watered situations it becomes more branching and erect; in dry wind-swept areas a plant often consists of a single prostrate caudex. It blooms through the entire growing season and may be found even late in October in protected spots. Dr. Rydberg said of the specimen I submitted to him for identification: "*P. saximontana* Rydb. approaching *rubripes;* I am afraid the two species run too much into each other and probably are but one." The other species of the group "Rubricaules" of the Flora of Colorado which have been reported from Pike's Peak evidently were the variations of this species.

P. viridior Rydb. is often similar to *P. saximontana* in habit but differs in its narrower, darker petals and larger leaf surface. It blooms earlier in the same localities and typical plants are taller and "stemier" with the leaves darker green above. According to Dr. Rydberg the leaves of the plants of this locality seem to be whiter beneath than those of the type plant. This species is quite frequent along trails and rivulets up to 12,200 feet.

P. filipes Rydb. is quite variable and not found above 12,000 feet. This species is *P. pulcherrima* of the Flora of Colorado but the altitudinal range should be extended upward 2,000 feet, for it occurs in dense patches on grassy banks well above timber

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line. Leaves with seven and nine or even more leaflets are common, especially where the struggle for existence is keen as in dry, gravelly spots, and some leaves even assume a pinnate form under these conditions.

P. dissecta var. *glaucaphylla* Lehm. is abundant along stony water-courses up to 12,500 feet and is the earliest spring-blooming species. It is the only smooth-leaved *Potentilla* within the zone and the leaves are toothed only at the apex in marked contrast to the many lobes and divisions of the leaves of the other species. The species itself does not appear within the zone.

P. bipinnatifida Dougl. occasionally may be found well above timber line. It is abundant at 11,000 feet and at that altitude is a robust and branching plant. Above timber line it occurs only along the trails and is a small plant with contracted leaf surface and few flowers. In these situations it blooms in late August and seldom exhibits perfect development.

Dasiphora fructicosa (L.) Rydb. appears up to 12,500 feet and is especially noticeable among the alpine flowers for its shrubby habit. While it becomes quite dwarf and prostrate at the altitudinal limit, its bright yellow flowers make it always conspicuous and unmistakable.

BLANCHE SOTH

MANITOU, COLORADO

ADAM IN EDEN OR NATURE'S PARADISE*

EXTRACTS BY JEAN BROADHURST

CHAP. XIII

Of Misselto

The Forme.

MIffelto is an excrefcence arising from the branch or arm of the Tree whereon it groweth with a woody ftemme, parting it felf into fundry branches; * * * within the berry is contained a fmall black kernell or feed, which hath been put into the ground, and other places, but was never yet known to grow, it being indeed without any root.

* Illustrated with the aid of the Catherine McManes fund. Continued from August, 1910.

The Place and Time.

This excrescence groweth upon Apple-Trees, Pear-Trees, Crab-Trees, • • • but that which groweth upon the Oak, is very rare in *England*. • • • Ordinary Mistleto flowreth in the Spring; but the Berries are not ripe untill *October*, and abide on the Branches all the Winter, unless the Thrushes and other Birds devour them. It is one of those things wherewith countrey people adorn their houses at *Christmas*, and is celebrated in this old Caroll,

> *Holly*, and *Ivy*, *Missleto*,
> *Give me a red Apple, and let me go* &c.

The Signature and Vertues.

Clusius • • • gives orders that it should not touch the ground after it is gathered, and also saith, That being hung about the neck, it remedies Witch-craft.

CHAP. XIV

Of the Quince Tree.

The *Signature and Vertues*

THe Down of Quinces doth in some sort resemble the hair of the Head, the Decoction whereof is very effectual for restoring of Hair that is fallen off by the French Pox, and being made up with Wax, and laid on as a Plaster, it bringeth hair to them that are bald, and keepeth it from falling, if it be ready to shed: • • • The Juyce of raw Quinces is held as an Antidote against the force of deadly poyson, not suffering it to have any force in the body; for it hath been often found to be most certain true, that the very smell of a Quince hath taken away all the strength of the poyson of white *Hellebore*, which the Hunters of *Spain* and *Navarre* make to kill wilde Beasts, by dipping their Arrow-Heads therein. It is also certain, that if Quinces be brought into an house, where grapes are hung up to be kept dry all the year, they will assuredly rot. • • • The Marmalade of Quinces is toothsom, as well as wholesom, and therefore I cannot blame such Gentlewomen which are seldom without it in their Closets.

CHAP. XV

Of Mosses.

The Kindes

THe Sorts of thefe are very numerous: * * * I fhall therefore for brevity fake, fet down thofe which I find to be ufeful and let the reft alone; and the first is Our common ground-Moffe. 2. Cup-Moffe. 3. Club-Moffe. 4. Oak-Moffe. 5. Apple-Tree Moffe. 6. Moffe of a Dead Mans Skull. * * *

The Places and Time.

The common Moffe groweth more or leffe everywhere, but especially in fhadowy places, and is ufed in flating of houfes, in fome Countries. * * * but the last which is the Moffe of a dead Mans Skull is oftner brought out of Ireland * * *

The *Signature* and *Vertues.*

A Decoction of the long Moffe that hangs upon Trees, in a manner like hair, is very profitable to be ufed in the falling off of the hair, and this it does by Signature. * * * My Lord *Bacon* faith, that there is a fweet Moffe growing upon Apple-Trees, which is of excellent ufe for Perfumers, who if they knew it, would greedily catch after it. The Moffe that groweth upon dead Mens Skulls * * * becaufe it is rare, and hardly gotten * * * [is] more set by, to make * * * Weapon-Salve * * * but as *Crollius* hath it, it should be taken from the Skulls of thofe which have perifhed by a violent death.

CHAP. XXVIII

Of the Poplar Tree.

The Names.

BEcaufe Ivy is a plant that feldom groweth but where Trees grow, I have placed a tree next it, and that is the Poplar Tree: their leaves being alfo fomewhat alike; * * * In *Englifh* Afpe, and Afpentree, and may alfo be called, *Tremble*, after the French name; becaufe the leaves wag, though there be no wind: and therefore the Poets and others have feigned them to be the matter, whereof womens tongues were made, which feldom ceafe wagging. * * *

The Virtues.

• • • The young clammy buds, or eyes, before they break out into leaves bruised, and a little Honey put to them, is a good medicine for a dull sight by Signature.

CHAP. XXXIII

Of the Flower de Luce.

The Names

THe Greeks [have named] it *Consecratrix*, all great and huge things being counted by the Ancients to be Holy: but it was called Iris, • • • from the Rainbow whose various colours the flowers thereof doth imitate. • • • I have heard it called Rost Beef, for that the leaves being bruised smell some-what like it. The Flowerdeluce is called in English *Iris* but most commonly *Orris*.

The kinds

So many of the sorts as I find set down in *Parkinsons* Theater of Plants, I here set down: which are eight. 1. The greater Broad leafed Flowerdeluce. 2. The Greater Narrow leafed Flowerdeluce. • • • ; to which I adde, 1. *Iris tuberosa* the knobbed Flowerdeluce; 2 the common Flowerdeluce; 3. Water flags or wild Flowerdeluce.

The Form.

The Common Flowerdeluce hath long and large flaggy leaves, like the blade of a sword with two edges, amongst which spring up smooth and plain stalks, half a yard long or longer, bearing flowers towards the top, compact of six leaves joyned together: whereof three that stand upright are bent inward one toward another, and in those leaves that hang downward there are certain rough and hairy Welts, growing or rising from the nether part of the leaf upward, almost of a yellow colour. The Roots be long, thick and knobby, with many hairy threds hanged thereat; but being dry is without them, and white.

The *Signature* and *Vertues.*

• • • Take of the roots in powder half an ounce Cinnamon and Dill of each two drachms, Saffron a scruple, mix them well together, lay them on a Scarlet Cloth moistened in White wine, and apply it warm • • • . The green roots bruised and applyed to black and blew marks in the skin taketh them away • • • ; but it is better to apply it with red Rose water, and a little Lin-Seed Oyl,

or oyl of Parmacity in manner of a Pultis * * * An Electuary made hereof, * * * is very good for the Lungs, and helps cold infirmities of them, as Asthmas, Coughs, difficulty of breathing, &c. You may take it with a Liquoris ſtick, or on the point of a knife, a little of it at a time and often.

CHAP. XXXIIII

Of HORS-TAIL

IT is * * * of the forme of a Horſetail, which the ſtalk of leaves, being turned downwards, doth reſemble. By other names it is likewiſe called * * * *Aſprella* becauſe of its ruggedneſſe which hath not formerly been unknown to country Houſwives, who with the rougher kind hereof, called in Engliſh Shavegraſs, did, as now with Elder Leaves, but more effectually, ſcowre their Pewter, Braſs, and Woodden Vessels; and there-fore it hath been by ſome of them called Pewterwort: but I think that piece of Thriftineſſe with many other are laid aſide, which might profitably be revived, * * * Fletchers alſo and Combe makers poliſh their work therewith.

The Form.

The greater Horſetail that groweth in wet grounds, at the firſt ſpringing hath heads ſomewhat like to thoſe of Aſparagus, and after grow to be hard, rough, hollow ſtalks, joynted at ſundry places up to the top, a foot high: ſo made as if the lower part were put into the upper, whereat grow on each ſide a buſh of ſmall long Ruſh like hard leaves, each part reſembling an Horſetail, at the tops of the ſtalks come forth ſmall Catkins like unto thoſe of Trees; the root creepeth under ground having Joynts at ſundry places.

The Places and Time.

Many of the foreſaid ſorts grow generally up and down this Land, but ſome of them are not ſo frequent as others * * * : Small party coloured Horſetail, or Horſetail Coralline (whoſe leaves being bitten, ſeeme to be compoſed of Sand, from their grating between the teeth) groweth on a bog by *Smochal*, a wood nigh Bathe. * * * You may gueſſe where the reſt grow by their titles; they do all ſpring up with their blackiſh heads in *Aprill*, and put forth their blooming Catkins in *July*, ſeeding for the moſt part in *Auguſt*, and then periſh down to the ground, riſing afreſh in the Spring.

CHAP. XXXVI

Of Willow

The Names.

AFter so many Herbs, it will not be amiss to bring in a Tree, which though in form hath little, yet in vertue hath some affinity. The Willow • • • groweth with that speed, that it seemeth to leap. There is a greater sort, which is called in English *Sallow, Withy*, and *Willow*, and there is a lesser sort called *Osier*, small *Withy*, and Twig Withy • • • it is necessary to bind Faggots, or any other Commodities that stand in need thereof.

The Kindes.

Many are the sorts of this Plant, which Authors reckon up, whereof I shall set down only those which I conceive to grow in our own Country, and they are 1. The ordinary great white Willow-Tree. 2. The ordinary black Willow. 3. The Rose Willow. 4. The hard black Willow. • • • 17. The black low Willow. 18. Willow Bay. I shall describe only the first, that by it you may guesse at the rest.

The Vertues and Signature.

The leaves and Bark of Willow, but especially the Catkins, are used with good successe to staunch bleeding of wounds, • • • and [the bark] being mixed with Vinegar, it taketh away Warts and Corns and other the like callous flesh, that groweth on the hands or feet • • • . This Plant is not propagated by Seed, but any stick thereof, though almost withered, being fixed in the Earth, groweth: which Signature doth truly declare, that a Bath being made of the decoction of the Leaves, and Bark of Willow, restoreth again, withered and dead members to their former strength, if they be nourished with the fomentation thereof.

Of Cinckfoile

The Vertues

COmmon Cinckfoil is held to be effectuall for • • • preserving against venomous and infectious Creatures and Diseases • • • which it performeth, if the juyce be drunk in Ale, or red Wine, or the Roots or Leaves applyed to the Nose. Some hold, that the one leaf cures a *Quotidian*, three a *Tertian*, and four a *Quartan*, which is a meer whimsey; but the truth is, if you give a scruple of it (which is twenty grains) at a time, either in White-

wine, or White-wine Vinegar: you shall feldom miffe the Cure of an Ague in three fits, be it what it will, even to admiration, as Mr. *Culpepper* affirmeth. * * * The distilled water of the Roots and Leaves * * * , if the hands be often wafhed therein, and fuffered every time to dry of it felf, without wiping, it will in fhort time help the Palfie, or fhaking of them.

CHAP. LXIII

Of Mints

The Forme

MInt is fo well known that it needeth no defcription, yet it deferving one no lefs than other plants, I fhall not be fo injurious as to let it paffe without one, though it be the fhorter Garden mints which is the third kind above mentioned cometh up with ftalks four fquare of an obfcure red colour, fomewhat hairy, which are covered with round leaves nicked on the edges, like a Saw; of a deep green colour: the flowers are little and red, and grow about the ftalks circlewife, as thofe of Penny Royal: the root creepeth aflope in the ground, having fome ftrings on it, and now and then in fundry places it buddeth out afrefh, and will over-run the ground where it is fet, if it be let alone any long time.

The Vertues.

* * * Two or three branches thereof taken with the Juyce of Pomgranates, stayeth the Hiccoughs * * * It is a fafe medicine for the biting of a mad Dog, being bruifed with falt, and laid thereon. The powder of it being taken after meat helpeth digestion and those that are Splenetick * * * .

CHAP. XLV

Of Golden-Rod

The Vertues

THis Herb is of efpecial ufe in all Lotions, * * * : The decoction thereof, likewise helpeth to faften the teeth that are loofe in the Gums. * * * *Gerard* faith, that the dry Herb that came from beyond the Seas, was formerly fold for half a Crown an Ounce; but sence it was found to be fo plentiful on *Hampsteed-Heath*, and other places in *England*, no man will give half a Crown for an hundred weight of it. And here I may take an occafion, as

Gerrard doth, to ſpecifie the inconſtancy, and ſudden mutability of the people of this Age, who eſteem no longer of anything (how precious ſoever it be) then whilſt it is ſtrange and rare, verifying that common Proverb, *Far fetcht, and dear bought, is good for Ladies.*

CHAP. LI

Of the Pine Tree.

The Signature and Vertues.

CRollius, in his Book of Signatures, ſaith that the woody ſcales, whereof the *Pine Apple* is compoſed, and wherein the kernels lie, do very much reſemble the foremoſt teeth of a Man; and therefore Pine leaves boyled in Vinegar make a good decoction to gargle the mouth for aſſwaging immoderate pains in the teeth and gums. • • • The Kernels of the Apples are wholſome, and much nouriſhing whilſt they are freſh, and although they be ſomewhat hard of digeſtion, yet they do not offend • • •

CHAP. LXVII.

Of Fox-glove.

SOme • • • make it to be a kind of *Mullein*, but certainly it is not, neither was it known to any of the ancient Greek, or Latine Writers. *Fuſchius* makes, as if he were the firſt that called it *Digitalis*, being induced thereunto, by the hollow form of the Flowers, which are like Finger-ſtalls. • • • It hath no other name in Engliſh, that I know, but *Foxglove*, unleſſe ſome call it Foxfinger.

The Vertues.

The uſe of this Plant, if not the Plant it ſelf, was altogether unknown unto the Ancients, it being not ſo much as once mentioned in their Medicines; but that is no excuſe to the Phyſicians of our times, who, notwithſtanding the admirable properties thereof, do in a manner neglect it. The *Italians*, with whom it is in greater eſteem then with us, • • • have an uſuall Proverb with them concerning it, *Aralda* ſalveth all Sores; for they uſe it familiarly to heal any freſh or green wound • • • But the Reaſon why I treat of it in this Place is, because it hath been by later experience, found to be very available for the King's Evill, the Flowers being ſtamped together with freſh Butter and applyed to the place • • • .

A Table of the *Appropriations*, ſhewing for what Part every *Plant* is chiefly medicinable throughout the whole Body of Man; beginning with the *Head*; quoted according to the Chapters contained in this Book.

For the Head in generall.

WAllnuts, 1
Peony, 2
Poppy, 3
Squills. 4
Larch Tree its Agarick, and Turpentine. 5

For the Brain.

Wood Betony. 6
Sage, 7
Roſemary 8
Lavender, 9
Marjerome, 10
Primroſes, Cowſlips, and Beares Eares 11
Lilly of the Valli 12
Miſſelto. 13

For reſtoring Hair.

Quinces, 14
Moſſe, 15
Maidenhere, 16

For the Eyes.

Fennell 17
Vervaine, 18
Roſes, 19
Celandine, 20
Rue or Herb-Grace, 21
Eye-bright, 22
Clarey, 23
Hawkweed, 24

For the Eares.

Aſarabacca. 25
Ground Ivy, 26
Ivy, 27
Poplar-Tree, 28
Nightſhade, 29
Sow-fennell, 30
Sow-thiſtles, 31

For the Noſe.

Wake-Robin or Cuckow-pint. 32
Flower-deluce, 33
Horſetaile, 34
Shepherds purſe, 35
Willow, 36
Biſtort. 37
Tormentill, 38
Cinckefoile, 39
Sowbread, 40

For the Mouth in generall.

Medlars, 41
Mulberries, 42
Mints, 43
Purſlane, 44
Golden Rod, 45

For the Scurvey.

Scurvy-graſſe, 46
Small Houſeleeke, 47
Aloes or Sea Houſeleeke, 48
Fumitory, 49
Creſſes, 50

For the Teeth.

Pine, 51
Pomegranate, 52
Maſtick, 53
Maſter-wort, 54
Corall, 55
Corall-wort, 56
Reſharrow, 57
Henbane, 58
Wild Tanſy, 59

For the dryneſſe of the Mouth.

Fleawort, 60

For the diſeaſes of the Throat, as Roughneſs, Quinſy, Kings Evill, &c.

Throat-wort, 61
Date-Tree, 62
Winter Green, 63
Horſetongue, 64
Figge-wort, 65
Archangell, 66
Foxglove, 67
Orpine, 68
Pellitory of the wall 69
Wheate, 70
Barly, 71
Garlick, 72
Liquorice, 73
Figge-Tree, 74
Hyſſope, 75

Rag-wort,

FIG. 6. The table of appropriations.

CHAP. LXX

Of Wheat

The Vertues.

THe bread that is made of Wheat being applyed hot out of the Oven for an hour, three daies together, to the Throat that is troubled with Kernels or the Kings Evill, healeth it perfectly; and Slices of it, after it is a little ftale being foaked in Red Rofe Water, and applyed to the eyes that are hot, red, and inflamed, or that are bloodshot, helpeth them. The flower of Wheat • • • and mixed with Vinegar and Hony, boyled together healeth all freckles, fpots, and Pimples on the face: Wheat flowre being mixed with the Yolk of an Egge, Honey, and Turpentine, doth draw, clenfe, and heal • • • . The Leaven of Wheat Meal hath a property to heal and to draw; and in efpeciall it rarifieth the hard fkins of the feet and hands; as alfo Warts, and hard knots in the flefh, being applyed with fome salt. • • • *Pliny* faith, That the Corns of Wheat, parched upon an Iron Pan, and eaten, is a prefent remedy for thofe that are chilled with cold. • • • *Difcorides* faith, That to eat the corns of green Wheat hurteth the ftomach • • • but chewed and applyed to the biting of a mad Dog, it cureth it.

CHAP. LXXIII.

Of Liquorice

The Kindes.

TO this kind four forts may be referred. 1. Common Liquorice. 2. *Difcorides*, his Liquorice. 3. The moft common Liquorice *Vetch*. 4. Another Liquorice *Vetch*.

The Vertues.

The Root of Liquorice is good againft the rough hardneffe of the Throat and Breaft, it openeth the Pipes of the Lungs • • • and ripeneth the Cough • • • The Scythians are faid, by chewing this in their mouths to keep themfelves from thirft in their long journeys through the deferts for ten or twelve daies; and ftayeth hunger alfo • • • .

CHAP. LXXIX

Of Elecampane.

HAving appropriated feverall Simples, to the infide and outfide of the Throat, The Breaft comes next in Order to be provided for, both internally and externally, to which there is nothing more proper than Elecampane * * * : fome think it took the name from the tears of *Helen,* from whence it fprung, which is a Fable; others fay it was fo called becaufe *Helen* firft found it available againft biting and ftingings of venemous Beasts; and others think it took its name from the Ifland *Helena* where the beft was found to grow. * * *

The Kindes.

To this Plant, which otherwife would be fingle, do fome refer the Flowers of the Sun, as 1. The greater flower of the Sun. 2. The lefser flower of the Sun. 3. The Male flower of the Sun. 4. The Marigold Sunflower.

The Forme.

Elecampane fhooteth forth many large leaves lying neer the ground, which are long and broad, but fmall at both ends; fomewhat foft in handling, of a whitifh green on the upper fide; and gray underneath, each fet upon a fhort ftalk: From amongft which, rife up divers great and ftrong hairy ftalks, two or three foot high with fome leaves thereon compaffing them about at the lower ends, and are branched towards the tops bearing divers great and large flowers like unto thofe of the flower of the Sun, of which it is faid to be a kind, as I faid before; both the border of the leaves and the middle Thrum being yellow, which is not wholly converted into large seed, as in the flower of the Sun; but turneth into Down with fome long fmall brownifh feed among it, and is carried away with the wind: the Root is great and thick, branched forth divers waies, blackifh on the outfide, and white within, of a very bitter tafte but good fent, efpecially when it is dryed, no part elfe of the plant having any fmell.

The Places and Time.

This is one of the Plants, whereof England may boaft as much as any: for there growes none better in the world then in England; let Apothecaries and Druggifts fay what they will. It groweth in meadows that are fat and fruitful as in *Parfons* Meadow by *Adderbury* as I have been told, and in divers other places about *Oxfordfhire.* It is found alfo upon the Mountains and fhadowy places that be not altogether dry: it groweth plentifully in the fields on the left hand as you go from *Dunftable* to *Puddle* hill. Alfo in an Orchard as

you go from *Colbrok* to *Ditton* Ferry, which is the way from London to *Windsor and* in divers places in Wales, particularly in the Orchard of Mr. *Peter Piers* at *Guiernigron* neer St. *Asaphs*. The flowers are in their beauty in *June* and *July*, the best time to gather the roots is in Autumn, when the leaves fall; yet it may be gathered in the Spring before they come forth.

The Vertues.

Elecampane • • • helpeth shortnesse of Wind • • • . A decoction of the Root is good against poyson and bitings of Serpents • • • bruised and put into Ale or Beer, and daily drunk, cleareth, strengtheneth, quickeneth the sight of the Eyes wonderfully. • • • *Pliny* saith that *Julia Augusta* let no day pass without eating some of the root • • • which it may be she did to help digestion, to expell Melancholy and sorrow, and to cause mirth • • • for all which it is very effectual.

CHAP. LXXXII

Of Reeds, *but especially of the Sugar Cane or* Reed.

The Forme.

THe Sugar cane is a pleasant and profitable Reed, having long stalks seaven or eight foot high, joynted and Knee'd like the common walking Canes, but that the Leaves come forth of every joynt on every side of the stalk one, like unto wings long narrow and sharp pointed. The Cane it self or stalk is not hollow as other Canes and Reeds are: but full and stuffed with a spungious substance, in taste exceeding sweet. The root is great and long creeping along within the inner crust of the earth, which is likewise sweet and pleasant, but lesse hard or wooddy then other Canes or Reeds; from which do shoot many young Cions which are cut away from the main or Mother plant; because they should not draw away the nourishment from the old stock; and so get unto themselves a little moisture, or else some substance not much worth, and cause the stock to be barren, and themselves little the better: which shoots de serve for plants to set abroad for increase.

The Places and Time.

The Sugar Cane groweth naturally in the East and West *Indies*, the *Barbadoes*, *Madera*, and the *Canary* Islands, and *Barbary* also. It is planted likewise in many parts of Europe at this day • • • some shoots have been planted in England but the coldnesse of the

climate quickly made an end of them. * * * The Sugar cane is planted of the year in thoſe hot countries where it doth naturally grow, by reaſon they fear no froſts to hurt the young ſhoots, at their firſt planting * * * .

The Vertues.

Sugar is good to make ſmooth the roughneſſe * * * of the Lungs, cleareth the voice and putteth away hoarſneſs and the Cough; and ſo doth Sugar Candy. Sugar or White Sugar Candy, put into the Eye, taketh away the dimneſſe, and the blood ſhotten theirin * * * . This is the Phyſical uſe of Sugar, which hath obtained now a daies ſo continall and daily uſe; that it is almoſt accounted not Phyſicall, and is more commonly uſed in Confections, Syrups, and ſuch like; as alſo preſerving, and conſerving ſundry fruits * * * to write all which, is beſides our Intentions. Now for our ordinary Reeds * * * . The freſh leaves bruiſed, or the roots applyed to thoſe places that have Thorns, Splinters, or the like in the fleſh do draw them forth in a ſhort ſpace * * * ; the Ashes made of the outer rind of the ſtalk, mingled with Vinegar, helpeth the falling of the hair. If the flower or woolly ſubſtance happen into the ears, it ſticketh theirin ſo faſt, as that by no means it will be gotten forth again, but will procure deafneſſe withal. Some have obſerved that the Fern and the Reed are at perpetuall enmity, the one not abiding where the other is: which may be, as my Lord *Bacon* ſaith, not becauſe of any Antipathy in the plants; but because they draw a like nouriſhment, and ſo ſtarve one the other; whereas there is such amity they ſay, between Aſparagus and the Reed, that they both thrive wondrous well, which is becauſe they draw a different Juyce. Reeds are alſo put to many neceſſary uſes, as to thatch houſes, to ſerve as walls and defence to Gardiners in the cheriſhing of their plants, to Water-men to trim their boats, to Weavers to wind their yarn on and for divers other purpoſes: Nay thoſe that grow in the *Indies* by reaſon of the heat of thoſe Climates grow ſo great and tall, that they ſerve inſtead of timber, both to build their houſes and to cover them.

CHAP. XCVI

Of Periwinckle.

The Kinds.

THere be divers Sorts or Kinds of *Periwinckle*, whereof ſome be greater, others leſſer; ſome with white Flowers, others Purple, and double, and ſome of a fair blew Sky Colour.

The Forme.

The common Sort of *Periwinckle* hath many Branches, trailing or running upon the ground, ſhooting out ſmall Fibers at the Joynts as it runneth * * * and with [the leaves] come alſo the Flowers (one at a joynt standing upon a tender Foot-ſtalk) being ſomewhat long and hollow, parted at the brims, ſometimes into four, ſometimes into five leaves, of a pale blew colour. The Root is not much bigger then a Ruſh, buſhing in the ground, and creeping with his Branches far about, whereby it quickly poſſeſſeth a great compaſſe, and is therefore moſt uſually planted under hedges, where it may have room to run up upon the ſticks, which it doth encompaſſe, and bind over and over, and is perhaps from thence called *Vinca Per vinca.*

The Vertues.

* * * It is likewiſe good againſt the biting of Adders, being bruiſed, and applyed to the place, eſpecially if the infuſion thereof in Vinegar be taken inwardly. *Parkinson* ſaith, it is a tradition with many, that a wreath made hereof, and worn about the Legs, defendeth them from the Cramp; by which words he ſeemeth in my judgment, to doubt of the truth thereof; but indeed, he needed not ſo to do; for I knew a friend of mine who was very vehemently tormented with the cramp, for a long while, which could be by no means eaſed, till he had wrapped some of the Branches hereof about his Legs * * *. Mr. *Culpepper* writeth that *Venus* owns this Herb, and saith, That the Leaves eaten by Man and Wife together, cauſe love, which is a rare quality indeed if it be true.

(*To be concluded.*)

SHORTER NOTES

The Catherine McManes Fund.—The fund announced in Torreya two years ago which has since provided the unusual number of illustrations has been renewed; one hundred dollars has been given for the coming year and another hundred is promised for the year following. This fund has made it possible to print many papers for which the authors demanded illustrations, and it is hoped that the fund will help make Torreya more desirable, both to readers and contributors.

The geographical distribution of *Lespedeza striata*. This native of eastern Asia was introduced into North America during the first half of the last century, and at once established itself as a naturalized member of our flora. Just how early the

species was introduced appears to be uncertain, but the popular belief held throughout the Southern States, namely that the plant was brought into that section during the Civil War period, is erroneous, although it was doubtless then disseminated in various sections where it had not been before observed. The late Professor Porter found it thoroughly naturalized in middle Georgia as early as 1846 while he was a resident of that state. Its advent was probably unnoticed by the native residents on account of the relative inconspicuousness of the plants, and how long previous to 1846 the plant may have been established as a member of our flora Professor Porter was not able to learn.

During the first half of the last century the plant seems to have spread slowly; however, during the second half, it advanced north, northwest, and west, apparently establishing itself permanently wherever it gained a foothold.

On account of local means of dispersal *Lespedeza striata* spread westward more rapidy than northward The end of the last century saw it established in Texas, Kansas, and Illinois, while it was not until the beginning of the present century that it got a firm hold in southern Pennsylvania.

The geographical range for the species given in the several floras within whose limits it occurs are too narrow, and should read Pennsylvania to Kansas, Florida, and Texas.

J. K. Small

REVIEWS

Ganong's Teaching Botanist*

Progressive teachers of botany already possess well worn copies of the first edition of this pioneer contribution to the pedagogy of their subject. The second edition, "rewritten almost throughout", is brought abreast of the advance of the past decade in botanical education, and will, no doubt, be even more warmly welcomed than was the first edition.

The title not only names the book, but designates the class of readers to whom it is addressed, and to whom it will make its

*The Teaching Botanist. By William F. Ganong, Ph.D. Second edition. Pp. xi + 439; plates 2; figures 40. $1.25. The Macmillan Co., New York. 1910.

strongest appeal. The book will not commend itself to that type of university professor who regards research and the direction of it as the chief end of man, and his teaching as only a necessary evil, essential in order to hold his position and justify his salary. Undoubtedly the pendulum has reached the end of its swing in this direction, and there has already begun a return to the more stable and desirable condition where efficient teaching of the science is regarded, not only as worth while for its own sake, but absolutely essential to the greatest growth and development of the science.

That there are at present more vacancies in botanical positions in the United States than there are competent men to fill them, is due in large measure to the fact that a more than amateurish presentation of introductory and even advanced courses by men absorbed in research, and "teaching" under protest, has failed to make a strong appeal to young men and women of ability. It is not, for a moment, meant to be here implied that research should be considered as secondary in importance to teaching, nor that some men should not give all their time and energy to investigation, nor that it would not be an educational blunder for some men to engage in the instruction of beginning classes rather than in enlarging the boundaries of our knowledge. But, on the other hand, it is maintained, as emphatically as possible, that teaching should not be considered as secondary in importance to research; and that one who devotes his time and talents to the problems and needs of botanical education should no longer be considered to have "done nothing" in his position.

It is an almost self-evident truth that the teacher should have the spirit of research, but if his inclinations lead him to make a contribution to the improvement of botanical education this should be considered by every one interested in any phase of botany as important and valuable a service as the discovery of a new chromosome or a new mendelian ratio.

The writer believes that there is no error more widespread or more erroneous than that knowledge of a subject, alone and of itself, confers teaching power or is the sole need in the preparation of a teacher. "The Teaching Botanist" is a protest against this

point of view, and a positive, constructive contribution toward the solution of the problem of more effective botanical teaching.

Chapter I. should be learned by heart and taken to heart by every earnest teacher. The chapter-headings are substantially the same as those in the first edition, while the appendix includes the "Unit Course in Botany Formulated by a Committee of the Association of Colleges and Secondary Schools of the North Central States", as well as the "Course of the Botanical Society of America and the College Entrance Examination Board".

Teachers of all grades, experienced and inexperienced, cannot fail to derive both profit and inspiration from this admirable volume.

C. STUART GAGER

THE BROOKLYN BOTANIC GARDEN

OF INTEREST TO TEACHERS

SOME FALLACIES OF BOTANY TEACHERS

Among the fallacies enumerated by Joseph Y. Bergen in *School Science and Mathematics* for December, 1909, the following paragraphs seem of special interest.

"There is beginning to be a vigorous demand, perhaps most noticeable in parts of the middle west, for a highly 'practical,' *i. e.*, economic, kind of instruction in botany and zoölogy. It is felt that, for one thing, the teaching should be so shaped as to make use of the commonest garden and field plants to illustrate plant anatomy and physiology. Of course no teacher in his senses would hunt up a rare greenhouse orchid to demonstrate a point which could be equally well shown by the use of a garden lily, a hyacinth, or an onion. But, * * * there is a very specious fallacy in the unqualified insistence on the use of common material. * * * The cabbage is a most familiar plant, therefore let us make stomata easy for him by giving him cabbage leaves to histologize. Now a single trial would convince any unbiased teacher that the familiar cabbage leaf is not nearly as easy a subject for the study of stomata as are easily peeled leaves, like those of the iris, or firm ones for cross sectioning, like those of

Cycas. So, too, the fact that the common bean is a highly useful plant and *Sedum* or *Trillium* is not would still leave the bean flower much the poorest of the three with which to begin the study of floral structures.

"A still more radical phase of the movement toward economic biology appears in the demand for lessons on all sorts of topics bearing on horticulture and farming, from injurious insects to plant breeding. Doubtless in some country high schools a good deal of such work can be made thoroughly interesting and profitable. And in any schools such matter, in very moderate amounts, may properly be assigned for supplementary reading. Leaving out business and other technical courses, however, when one begins to make economic consideration the measure of educational values he begins to pile up absurdities. As soon as the teachers of geography, history and geometry are willing to bend most of their respective efforts toward instruction regarding commercial routes, the alternation of periods of activity and depression in the world's business, and mensuration, it will be time for biology teachers to consider favorably corresponding pseudo-utilitarian innovations. But if the most valuable crop that any country can produce is intelligent men it must follow that any kind of study which is preëminently suited to cultivate habits of careful observation and orderly thinking in school children is especially important. Then that kind of biology which gives young people some adequate conception—partly obtained from their own field and laboratory studies—of the animal and plant inhabitants of the earth, is better worth while than that which primarily leads to more abundant hay, grain, butter and pork making. In other words, we can develop the faculties of a boy faster and further (and therefore do more for the world) by setting him to work on the structure and functions of the corn plant than by making him count and weigh the kernels of a half dozen ears of as many improved varieties of corn. Such counting and weighing, unless they form part of an extended, systematic investigation carried on by the student, have no more educational value than keeping tally of the loads of coal sent out by a fuel company.

"There has been among teachers of botany an idea, now fast vanishing, that ecology is at once the easiest and the most interesting department of the science. * * * High school pupils can learn a few useful facts about such matters as heliotropic and geotropic movements of plants, the occurrence and meaning of deciduousness among trees, insect pollination, competition, the concept of a plant formation and a plant association. Further they cannot profitably go.

"Though the belief that plant ecology is 'easy' is obsolescent, an equally pernicious notion that plant physiology is 'hard' still prevails. It has, in some instances, gone so far as to lead to something perilously near to the complete omission of the subject from the text-books and the class work. Of course the more recondite matters, such as the causes of the movements of liquids in the plant body, the precise function and *modus operandi* of stomatal movements, the details of sexual reproduction in many groups, and a host of other topics are difficult enough to tax the energies of a Pfeffer, a Strasburger, or a DeBary. But there are so many simple, manageable things for the young beginner to work out! It is far easier for him to discover for himself the fact and roughly to measure the amount of transpiration, to prove the dependence of starch production on light, and roughly to ascertain the temperature limits within which germination of a given kind of seed is possible than to learn by his own observations anything worth while about fibro-vascular bundles or even to master the details of pollination in *Asclepias* or most orchids.

"A few words should here be said about the very prevalent idea, that since plants have been evolved from the unicellular condition to that of the most complicated assemblage of structures found among seed plants, the pupil's knowledge of them should be gained along the same road. Perhaps with students of twenty this might be true, though one of the best all-round teaching professors of botany whom I have known, found that his classes of college beginners in the subject could not do anything like the year's work when they began with the cell as a unit that they could and did when they began with readily visible and somewhat familiar forms. It is doubtful whether the

English-speaking world has ever known a more successful teaching biologist than Huxley and there are still some of us who remember how he reversed the order of treatment in his Biology, after a thorough trial of the evolutionary order in the first edition. . . .

"To me it has always seemed a wrong done to the learner to give him a specially coined Greek derivative where a single English word or a manageable compound will serve. Seed-plant, rootstock, sac-fruit, for those who are not and are not to become technical botanists, are just as good terms as spermatophyte, rhizome, and ascocarp, while they are far easier to learn and to remember. It is indeed a pity that we have not a host of simple terms like the German *Keimblatt*, *Markstrahl*, and so on, but let us use what we have."

Upham's Introduction to Agriculture is designed for the eighth grade, but it contains much that is more simply told than in many of our high school text-books. Any high school teacher of botany (and zoölogy) will find it a very helpful addition to the class library.

A double flowering dogwood is reported in *Science* (June 10) by F. L. Stevens and J. G. Hall. There is an "excessive development of the small bracts that subtend the individual flowers of the ordinary head" and a "suppression of all the individual flowers except the central one which appeared entirely normal."

In *Science* for August 12, Professor T. D. A. Cockerell makes a plea for the better care of types—for their more careful housing and for stricter rules concerning the loaning of type specimens to individuals and to institutions. Professor Cockerell considers a type "from its nature, in some sense the property of the scientific world."

In Buller's Research on Fungi (1909) spore ejection was proven by means of a beam of light. It is stated that "ejection is independent of hygroscopic conditions, takes place but slowly at 0°, and is stopped by anesthetics and by lack of oxygen. It is

therefore a phenomenon of protoplasmic activity, not a mere result of hygroscopic tension."

In *Science* (July 8) Albert Schneider referring to the botanical garden symposium papers (A. A. A. S. of Boston) pleads for "practical significance" in the experimental work of botanical gardens; he also insists that in such gardens and experiment stations the major part of the work should be establishing and developing new plant industries.

Recently a Montclair (N. J.) magistrate imposed a twenty dollar fine on an electric light employe who cut the tops from two trees to make room for wires. Such conscious and wilful law-breaking is too rarely thus treated; and consequently, as the New York *Tribune* says, "with all our Arbor Day formalities and all our praiseworthy talk of conservation, the destruction of trees as the victims of laziness or sordidness goes on at a discreditable rate."

Governor Hadley of Missouri is one of a group of progressive western men who are planning to establish farm colonies of families who have the capacity and the ambition essential to make a success of farming, but who never can, under present conditions of living, obtain the capital required for the transfer from the city to the country.

A colony would include several forty acre farms with a central model farm. According to the *Outlook*, that would be occupied by a director, an expert agriculturist. Dr. F. van Eeden, the Dutch sociologist and writer, is planning a colony of Dutch farmers near Wilmington (N. C.), which will also be a practical illustration of social organization.

The future wheat supply of the United States from the point of view of (1) increase in wheat acreage and (2) increase in acre yields is discussed by Professor M. A. Carleton in a recent *Science* (August 5). The first may be reached by an expansion in the farm area or by devoting a larger percentage of the present farm

area to wheat. Professor Carleton calculates that by 1950 the "improved farm area" will reach 760,000,000 acres, and that there will also be a gain in the percentage of farm land devoted to wheat, giving 76,000,000 acres of wheat land. In the last forty years there has been a gain of 1.8 bushels to an acre; by 1950 a yield of 16.8 bushels per acre is predicted—a gain of 2.7 bushels per acre. The methods of increasing the acre yield: (1) the introduction of better adapted varieties, (2) hybridization and selection in existing varieties, and (3) better methods of cultivation are discussed. Professor Carleton states that the most important introduced wheats were those of the Fife (brought from eastern Europe through Scotland and Canada into the northern states of the plains) and from Crimea or Turkey (brought from the Crimea and established in the middle states of the plains). The combined output of these two types of wheat now comprises nearly the entire wheat production of the country. These wheats have not only extended the area to the north and west but have increased the acre yield. Credit is given the U. S. Department of Agriculture for much improvement in existing varieties by selection and by hybridization. Yet, that and the improvement due to progressive farming methods are deemed but in their infancy.

Recent study by K. F. Kellerman and J. R. Robinson, of the Bureau of Plant Industry, shows that the presence of magnesium carbonate (0.25 per cent. or over) is "positively inhibitive to nitrifying action; *i. e.*, toxic to the bacteria so important to the nutrition of plants". Calcium carbonate is favorable up to two per cent. Fairly pure calcium carbonate should therefore be used in liming soils already containing magnesium.

At the third International Botanical Congress held in Brussels in May some new rules on nomenclature were formulated. Linnaeus's Species Plantarum, 1753, is to be retained as the starting point for the myxomycetes, lichens, and liverworts; but more recent authorities are to be used for fungi (1801, Persoon, and 1821–32, Fries); for algae (Linnaeus in part; 1848, Rolfs; 1886–

88, Bornet and Flahault; 1900, Hirn; and 1892–93, Gomont); and for mosses (1801–30, Hedwig).

NEWS ITEMS

The death of Samuel Bowdlear Green, dean of the school of forestry and the University of Minnesota, has recently been announced.

E. Dwight Sanderson, of the New Hampshire Agricultural Experiment Station, has been made dean of the College of Agriculture, West Virigina University.

Professor Edward W. Berry, associate professor in paleobotany at Johns Hopkins University, has recently been appointed geologist on the United States Geological Survey.

Arthur W. Merrill, of the Baron de Hirsch School, has been made director of the secondary school of agriculture to open in Vermont at Lyndon Institute, Lyndon, Vermont. A two-year course in scientific agriculture, planned to prepare young men for "successful farming under Vermont conditions" is offered to residents of the state. The school has been made possible through a gift by Theodore N. Vail; and two methods of paying expenses—by cash or by work—are offered the students.

The fall lectures at the New York Botanical Gardens are to be given at four on Saturdays, as usual. The program includes: Orchids, Wild and Cultivated, by Mr. G. V. Nash, September 17; The Botanical Gardens of Europe, by Dr. W. A. Murrill, September 24; Some Floral and Scenic Features of Jamaica, by Dr. M. A. Howe, October 1; Carnivorous Plants, by Professor H. M. Richards, October 8; Autumn Flowers, by Dr. N. L. Britton, October 15; Plant Diseases and their Control, by Mr. F. J. Seaver, October 22; Explorations in Santo Domingo, by Mr. N. Taylor, October 29; The Flora of Switzerland, by Professor E. L. Burgess, November 5; Some Economic Plants of Mexico, by Professor H. H. Rusby, November 12; and Cuba, Its Flora and Plant Products, by Dr. N. L. Britton, November 19.

TORREYA

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A FEW MORE PIONEER PLANTS FOUND IN THE METAMORPHIC REGION OF ALABAMA AND GEORGIA

By Roland M. Harper

In a few comparatively recent papers* I have announced the discovery in the Piedmont region and mountains of Alabama and Georgia of several species of plants previously supposed to be confined to the coastal plain, or nearly so; and as every county in Alabama and all but a few of the more inaccessible ones in Georgia have now been visited by botanists, it seemed a short time ago as if the possibility of additional discoveries of this kind must be almost exhausted. But in June of this year, when I had occasion to spend a few days among the mountains of eastern Alabama and western Middle Georgia, I found that this was by no means the case.

On the 6th and 7th of the month named I was on the Blue Ridge where it forms the boundary between Talladega and Clay Counties, Alabama, a few miles south of Cheaha Mountain, the highest point in that state.† (All the plants mentioned below as occurring on this ridge were seen on the southeastern slope, in Clay County, within a few miles of Erin and Pyriton.) On the 8th and 9th I explored parts of the Pine Mountains of Meriwether County, Georgia, within a few miles of Bullochville (Warm Springs) and Woodbury, where I had found many interesting things in 1901 and 1908.

There are some interesting similarities and differences between

*For Alabama, Torreya **6**: 111–117. Bull. Torrey Club **33**: 523–536. 1906; for Georgia, Bull. Torrey Club **30**: 294. 1903; **36**: 583–593. 1909.

†Its altitude is supposed to be 2,407 feet. Some interesting notes on the vegetation of this ridge can be found on pages 58–64 of Mohr's Plant Life of Alabama.

[No. 9, Vol. 10, of Torreya, comprising pages 193–216, was issued September 23, 1910.]

these two ranges of mountains. Each consists for the most part of a single prominent ridge trending approximately northeast and southwest, and they are also alike in being formed of sandstone rocks (presumably pre-Cambrian in age, for they contain no fossils), and having long-leaf pine more abundant than any other kind of tree on their slopes. The Pine Mountains, however, are about 1,000 feet lower than the Blue Ridge and half a degree farther south (being the southernmost mountains in the eastern United States).

Some of the most interesting finds in the way of coastal plain plants in both states were made in wet ravines on the mountain slopes. These ravines all contain small clear streams, beginning gradually near their heads and varying in length with the wetness of the season, and of course descending rapidly in the usual manner of mountain rivulets. The bottoms and sides of the ravines are strewn with loose subangular rocks of various sizes,

FIG. 1. *Pinus palustris* on rocky slope of a ravine on a spur of the Blue Ridge northwest of Pyriton, Alabama. June 7, 1910.

but there are very few cliffs or waterfalls, at least in the smaller ones, their slopes being comparatively uniform. This is prob-

ably because the mountains are composed of essentially homogeneous rocks, without well-defined stratification, faults, etc.

In most parts of eastern North America ravines contain vegetation approaching the climax type, but here succession has not progressed very far, as shown by the large proportion of evergreens, etc. The vegetation of these mountain ravines bears about the same relation to that of the adjacent pine-covered slopes as that of branch-swamps in the wire-grass country of Georgia does to the surrounding pine-barrens,* and there are quite a number of species common to the corresponding habitats in the two otherwise very dissimilar regions. Analogous relations also exist between the dry mixed forests and the banks of streams on the Cumberland Plateau (Lookout Mountain, Sand Mountain, etc.) of Georgia, Alabama, and Tennessee, where succession has progressed a little farther, and the long-leaf pine has long ago disappeared, if it ever grew so far inland.

The following species (arranged in approximate order of abundance, etc.) were seen in mountain ravines in both states, in the week under consideration.

Trees: *Acer rubrum*, *Magnolia glauca*, *Liriodendron*, *Ilex opaca*, *Persea pubescens*, *Oxydendron*, *Pinus Taeda*.

Shrubs and woody vines: *Alnus rugosa*, *Kalmia latifolia*, *Smilax laurifolia*, *Decumaria barbara*, *Myrica carolinensis*, *Symplocos tinctoria*, *Azalea nudiflora*. (Just about half the woody plants are evergreen.)

Herbs: *Osmunda cinnamomea*, *O. regalis*, *Lorinseria areolata*, *Galax aphylla*, *Carex crinita*.

In addition, *Fagus*, *Xolisma ligustrina*, *Viburnum nudum*, and *Dryopteris Noveboracensis* were noted in several such places in Alabama, and might have been seen in Georgia as well if I had examined as many ravines as I did in Alabama on this trip. Several species which were seen less frequently will be mentioned below.

Quite a number of other pioneer bog plants were found on June 9 in a moist meadow about half a mile east of Woodbury, Georgia, the same place where I had made some interesting

*See Ann. N. Y. Acad. Sci. 17: 62. 1906.

discoveries nearly nine years before.* Several species of more climax tendencies, though nevertheless mainly "austroriparian" in distribution, were found on the same day along the Flint River where it cuts through the Pine Mountains in a series of rather narrow gorges, and in the swamp of one of its tributaries, Cane Creek, on the north side of the mountains about two miles east of Woodbury.

The following annotated list of noteworthy plants also includes two species which were observed from a train between Birmingham and Pell City, Alabama, on June 4.

Halesia diptera L. Several unmistakable specimens (with full-grown fruit) of this little tree were seen on the banks of the Flint River in Meriwether County, Georgia, at the southeastern corner of an amphitheater-like valley about three miles in diameter known as "the Cove." It was not known outside of the coastal plain before, though Dr. Mohr had reported it from the vicinity of Auburn, Ala.,† which is pretty close to the fall-line.

Osmanthus americanus (L.) B. & H. Common in a wet ravine in the Pine Mountains near Nebula, a small station a few miles south of Warm Springs. This species was entirely new to the known flora of Middle Georgia, and even in Alabama I had not seen it so far above the fall-line.‡ Its leaves at this station were rather narrower than they usually are in its favorite habitat, coastal plain hammocks. Some of the trees bore an abundance of young fruit.

Ilex coriacea (Pursh) Chapm. (*I. lucida* T. & G.). In the same ravine; not common, but some of the bushes were over ten feet tall, which is about as large as this species ever grows. This does not seem to have been reported from outside of the coastal plain before, though Dr. Mohr cited specimens from one of the fall-line counties of Alabama, not very far from this new station.

Persea pubescens (Pursh) Sarg. Seen in one mountain ravine in Alabama, and in two or three in Georgia, both near the Flint River and near Nebula. Unmistakable specimens were collected near the latter place on June 8. Dr. Mohr knew this in Alabama

*See Bull. Torrey Club **30**: 294, 326. 1903.

†Contr. U. S. Nat. Herb. **6**: 66. 1901.

‡See Bull. Torrey Club **33**: 536. 1906.

only from three extreme southern counties, Escambia, Baldwin and Mobile; and Professor Sargent in his Manual of Trees, 1906, restricts it to "Pine-barren swamps, . . . in the immediate neighborhood of the coast."

Nymphaea fluviatilis Harper. What I take to be this species was seen from the train, in the Cahaba River near Henry Ellen, in the eastern edge of Jefferson County, Alabama. In 1908 I had seen the same thing nearly as far from the coast in Middle Georgia.*

Myrica carolinensis Mill. As this was not known outside of the glaciated region and coastal plain until 1906, it might be worth while to mention here that small inconspicuous specimens of it, about knee-high, are not rare in damp ravines on the slopes of both the Blue Ridge and the Pine Mountains.

Pogonia divaricata (L.) R. Br. Rare in boggy places in mountain ravines in Clay County, Alabama, with *Osmunda cinnamomea* and several less common plants. Dr. Mohr knew this handsome orchid no farther inland than Tuscaloosa County, but Dr. Gattinger found it in the mountains of East Tennessee.

Pogonia ophioglossoides (L.). Ker. Although this is known from many scattered stations between the glaciated region and the coastal plain,† it is by no means a common plant in the highlands, and I had never seen it in Middle Georgia until I found several specimens in bloom in the meadow near Woodbury, previously mentioned.

Smilax laurifolia L. I have already reported this from the highlands of both states, but not from either of the mountain ranges under consideration, so it may be worth mentioning that I found it quite common in most of the wet ravines, as indicated in the foregoing habitat list.

Tillandsia usneoides L. In former years I had seen this characteristic coastal plain epiphyte along rocky banks of rivers a mile or two above the fall-line near Tallassee, Ala., and Columbus, Ga.,‡ but finding it among the Pine Mountains, over twenty miles from the fall-line in a straight line (and probably twice as

*See Bull. Torrey Club **36**: 589. 1909.

†See Rhodora **8**: 29. 1906.

‡See Bull. Torrey Club **33**: 527–528. Ann. N. Y. Acad. Sci. **17**: 266. 1906.

far by water), was quite unexpected. It grows in the gorge of the Flint River, at about the same place already mentioned under *Halesia diptera*, on various trees, principally *Quercus alba*. Some of it was forty or fifty feet up in the air, and some low enough to be reached from the ground, but it was not at all abundant. It happened to be in bloom at the time I saw it, and it is probably holding its own pretty well.

Lachnocaulon anceps (Walt.) Morong. In the moist meadow near Woodbury; rather rare. Previously known only from the coastal plain and Lookout Mountain.*

Rhynchospora rariflora (Mx.) Ell. With the preceding, not rare. Previously known only from the coastal plain, but its occurrence here is perhaps not so surprising since it has recently been reported from New Jersey.†

Panicum gymnocarpon Ell. In the swamp of Cane Creek, Meriwether County, Georgia. Previously known only from the coastal plain, from Georgia to Texas. With it I noticed two other species of somewhat similar distribution (though already known from a few stations outside of the coastal plain), namely, *Commelina hirtella* Vahl and *Trachelospermum difforme* (Walt.) Gray.

Anchistea virginica (L.) Presl. Seen from the train, in a sort of meadow just east of Brompton, St. Clair County, Alabama. The only other stations between the glaciated region and coastal plain on record for this species seem to be those in Cherokee and Chilton Counties, Alabama, and Pike County, Georgia, described in my earlier papers.

TALLAHASSEE, FLORIDA

A FOSSIL FIG‡

BY T. D. A. COCKERELL

Among some specimens collected by my wife at Station 14, in the Miocene shales of Florissant, I find two which, on careful inspection, prove to be figs. The genus *Ficus* has been recog-

*See Torreya 6: 114; Ann. N. Y. Acad. Sci 17: 268. 1906.

†W. Stone, Torreya 8: 16–17. 1908.

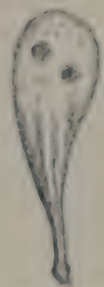
‡ Illustrated with the aid of the Catherine McManes fund.

nized in the Florissant flora from the leaves, two species being described, *F. florissantella* Ckll. and *F. arenaceaeformis* Ckll. A remarkable confirmation of the existence of *Ficus* there was made when Mr. C. T. Brues found among the insects collected long ago by Scudder a veritable fig-insect, which he described* as *Tetrapus mayri*, dedicating the species to Gustav Mayr, who was a great authority on the subject, and originally described *Tetrapus*. Now we have the figs themselves, and although it is very likely that they should be associated with one of the species described from the leaves, it is impossible to say which, so I give them provisionally a separate name.

Ficus Bruesi n. sp.

Fruit long-pyriform, about 33 mm. long and 11 mm. wide, as shown in the figure; basal part slightly plicate.

As preserved, the fruits are dark brown. The type specimen shows two round gall-like bodies, shown in the illustration, but from the dark color of the specimen inconspicuous in the actual fossil. One of these, in particular, contains an object which seems to have the indistinct outline of an insect, and I really believe that these objects are the *Tetrapus* developing within the fig.



Fruit of *Ficus Bruesi*.

The fig is remarkable for its elongated form, but similar species exist to-day. It is probably on account of this character that the name *longipes* has been applied to different species inhabiting Madagascar, Assam, and Mexico.

Other fossil figs have been found, one (*F. neurocarpa* Hollick, 1903) being as old as the Dakota Cretaceous.

Some fossil species of *Ficus* found in Colorado need new names, as follows:

Ficus coloradensis n. n.

Ficus irregularis Lx., Bull. U. S. Geol. and Geog. Surv. Terr. **1875** : 368. 1876. Not *F. irregularis* Miq., Ann. Mus. Bot. Lugd. Bat. **3** : 224. 1867; nor Steud., Nom. ed. **2** : 636

*Bull. Mus. Comp. Zoöl. LIV, 17. 1910.

Ficus ovaliformis n. n.

Ficus ovalis Lx., Bull. U. S. Geol. and Geog. Surv. Terr. **1875** : 387. 1876. Not *F. ovalis* Miq., Ann. Mus. Bot. Lugd. Bat. **3** : 298 1867.

Ficus denveriana n. n.

Ficus spectabilis Lx., Ann. Rept. U. S. Geol. and Geog. Surv. Terr. **1872** : 379. 1873. Not *F. spectabilis* Kunth & Bouché, Ann. Sc. Nat. Sér. III. **7** : 235. 1847.

Also the following from Alaska:

Ficus Dalli n. n.

Ficus membranacea Newberry, Pr. U. S. Nat. Mus. **5** : 512. 1883. Not *F. membranacea* Wright, Sauvalle, Fl. Cub. 149. 1873.

LOCAL FLORA NOTES—VI *

By Norman Taylor

Juglandaceae

1. *Juglans cinerea* L. This has not been found south of Newark, N. J., so far as our specimens show. In the catalog of New Jersey plants it is reported as rare in Monmouth and Ocean Counties. Has it ever been found south of this in our range?†

2. *Juglans nigra* L. In the New Jersey catalog the plant is said to be common, except in the pine-barrens. Has it since been found in this area? The Philadelphia botanists give no stations for it, and all our specimens are from regions north of the pine-barren country.

3. *Hicoria laciniosa* (Michx.) Sarg. Our only specimen is an old one from Sellersville, Bucks Co., Pa. General works credit

*Continued from Bull. Torrey Club **37**: 429–435. 1910.

†The local flora range as prescribed by the Club's preliminary catalog of 1888 is as follows: All the state of Connecticut; Long Island; in New York the counties bordering the Hudson River, up to and including Columbia and Greene, also Sullivan and Delaware counties; all of New Jersey; and Pike, Wayne, Monroe, Lackawanna, Luzerne, Northampton, Lehigh, Carbon, Bucks, Berks, Schuylkill, Montgomery, Philadelphia, Delaware, and Chester counties in Pennsylvania.

the tree to eastern Pennsylvania, central and western New York, and also to the middle West. It has apparently never been found in New Jersey. What is the true range of this species, which is certainly rare and local east of the Allegheny Mountains?

BETULACEAE.

1. *Carpinus caroliniana* Walter. None of the numerous specimens are from localities in the pine barrens, and the New Jersey catalog excludes it from this region. How near to the pine-barrens has the plant been found? Is it known from Burlington Co., N. J.?

2. *Corylus rostrata* Ait. So far as New Jersey is concerned this shrub is not known south of the terminal moraine, although specimens from Chester Co., Pa., bring it considerably south of the glaciated region in that state. From where in New Jersey, particularly in the south-central sections near Middlesex and Mercer Counties, has the plant been collected?

3. *Betula papyrifera* Marsh. Our specimens limit this species to the country north of a point which is approximately the northern state line of New Jersey, with two exceptions, Plainfield and Elizabethport, N. J. These two New Jersey records bring the plant much further south than its apparent distribution center, which is in the Catskills, and the hill counties of Pennsylvania. Does the plant grow between these points? Has it ever been found in Berks or Bucks Co., Pa.?

4. *Betula lutea* Michx. Our only two specimens are from the Catskills. Other records, for the most part substantiated by specimens, credit the plant to Lehigh, Monroe, and Pike Counties in Pennsylvania. Beyond this nothing seems to be known of its distribution within the range.

5. *Betula pumila* L. The flora of Pennsylvania, the Philadelphia catalog, and all our specimens exclude this plant from the whole state of Pennsylvania. Several stations in northern New Jersey and one in northwestern Connecticut complete our representation of this species. The exclusion from the high mountain parts of Pennsylvania and from the Catskills is almost inconceivable. It should be found in many cold bogs in the glaciated

part of our range, but for lack of evidence this is only conjectural.

Fagaceae

1. *Castanea pumila* (L.) Mill. There are no specimens from the range. The Philadelphia Club's catalog credits it to Gloucester, Salem, and Mercer Counties in New Jersey, and it is recorded from Chester County, Pa. Beyond this nothing is known of its range in our area.

2. *Castanea dentata* (March) Borkh. Has the chestnut ever been collected in the pine-barrens? Otherwise it is common throughout our range.

3. *Quercus coccinea* Marsh. The distribution of this species given in general works indicates a wider distribution than our four specimens show. They are all from near New York City. This species is probably common throughout the region, but specimens are lacking.

4. *Quercus triloba* Michx. (*Q. digitata* of the manual). Our only specimens are from Cedar Creek, N. J., and one marked simply "Pine-barrens of New Jersey." It is credited to Long Island, but the specimen on which this was based is the following:

5. *Quercus pagodaefolia* (Ell.) Ashe. There is only a single specimen of this oak from our range. West Hempstead, L. I., is the only station known for it. Until recently it was not supposed to grow north of Virginia, but collections at Nantucket and the Long Island station given above have brought the tree within our range. It may reasonably be expected to grow in the intervening country between Long Island and Virginia and the coastal part of New Jersey should contain this plant.

6. *Quercus Phellos* L. With the exception of a specimen from Tottenville (Bentley Manor), L. I., our specimens all come from below Middlesex Co., N. J. Has this tree been found in the latter county or from adjoining country in Mercer County? Records are extant but no specimens to substantiate them.

7. *Quercus imbricaria* Michx. The only specimen is from Flushing, L. I., and looks as though it might have been taken from a cultivated plant. The tree is entirely unknown on Long Island except for this; and its only other stations in the range,

as shown by the books, are Philadelphia and Lehigh counties in Pennsylvania. Has the tree established itself on Long Island?

8. *Quercus Alexanderi* Britton. Until recently this tree was not supposed to grow in our range, but specimens from Poughkeepsie and West Point indicate an apparent migration down the Hudson Valley. Has any one taken specimens from elsewhere in the range?

9. *Quercus bicolor* Willd. (*Q. platanoides* of the manual). Our specimens and the published records all show this as a rare tree in the pine-barren region. How generally distributed in this region is this species?

10. *Quercus lyrata* Walt. Riddleton, Salem Co., N. J., is the only station represented by specimens. According to the New Jersey catalog it is "Common in the middle and southern counties." Any specimens from this region will be welcome.

Ulmaceae

1. *Ulmus Thomasii* Sargent. (*U. racemosa* of the manual). In the catalog of the New Jersey plants there is the following record: "Along L. & H. R. R. R. above Woodruff's Gap, a single tree observed—Porter and Britton, 1887." There is a specimen for this record and one doubtful collection from Weehawken, N. J., many years ago. Beyond this nothing seems to be known of its distribution in our range.

2. *Ulmus fulva* Michx. This species well illustrates a discrepancy in the distribution of a great many of our local plants, as given in general works. "Quebec to Florida," etc., is about the general range given for the tree, while the fact is that it grows in our region only north and west of the coastal plain region. There are at least 500 species in our area that follow this line of distribution, and are to be excluded from the coastal-plain region altogether.

3. *Celtis georgiana* Small. In the Flora of Southeastern United States (page 365) this species is described as growing from Maryland to Georgia, etc. Since its discovery it has turned up in a number of new stations, among them one from Newton, Sussex Co., N. J. The specimens are perfectly authentic and apparently

like the more southern material. The species was not previously known from this area.

Urticaceae

1. *Urtica dioica* L. Our specimens indicate that this nettle is only rather sparingly established in the area. Small colonies are known from almost throughout the range, following no very well defined law of distribution. Most of the specimens are from near some fair-sized settlement.

2. *Urtica gracilis* Ait. Much more abundant in the northern part of our range than southward. So far as New Jersey is concerned only two stations are known south of New Brunswick, Burlington and Gloucester Co. Has it ever been seen in the southern part of the state? Does it grow on Long Island?

3. *Urtica Lyallii* S. Wats. This species, very doubtfully specifically distinct from *U. dioica* L., is represented by a single specimen from Delaware Water Gap. The character of its relative length of petiole is about its only basis for specific recognition, and many specimens of *U. dioica* have varying-sized leaf-stalks.

4. *Parietaria floridana* Nutt. This species is credited to our range in Dr. Small's Flora of Southeastern United States (page 359). There are no specimens, and its distributional tendencies in the region are unknown.

New York Botanical Garden

A NEW SPECIES OF BLUE-BERRY FROM NEW JERSEY

By Kenneth K. Mackenzie

On Decoration Day, 1907, while botanizing with Mr. W. W. Eggleston at Tom's River, New Jersey, flowering specimens of a blue-berry allied to *Vaccinium corymbosum* L. were collected by me from a shrub growing immediately east of Jack's Fork along the southern edge of the Pennsylvania Railroad right-of-way. The shrub grew in a white-cedar swamp with *V. corymbosum* (then in full bloom) and *V. atrococcum* (A. Gray) Heller (about

done flowering), and was in full bloom. It was so distinct in appearance that later in the year I secured fruiting specimens from the same bush. Since 1907 until this year I have not been in the pine-barrens at the proper season to study blue-berries in flower, but this year on May 15 I walked from Lakewood to Lakehurst especially to study them. The season was fully two weeks ahead of the season of 1907, and I found conditions exactly right for my study. Diligent search around Lakewood did not, however, reveal the plant I was hunting for, and it was not until I had reached the outskirts of Lakehurst that my search was rewarded. Here growing along the edge of the cranberry bog about a quarter of a mile north of the depot more shrubs were found. The result was not unexpected, for a number of plants grow around Lakehurst which do not seem to occur at Lakewood, and it is possible that the plant now under discussion is confined to those pine-barren bogs in which the peculiar white sands noticeable both at Tom's River and Lakehurst form the substratum.

An investigation of the collections at the New York Botanical Garden showed no flowering specimen of this shrub, but did disclose fruiting specimens evidently referable to it. Dr. Britton also informed me that he had long believed that the plant represented an undescribed species, but had never been able to secure complete material.

While an evident ally of *V. corymbosum* and having blue berries it is quickly distinguished as follows: *V. corymbosum* has a glistening white or pinkish-tinged conspicuous cylindrical to ovoid urn-shaped corolla 6–12 mm. long and 4–6 mm. wide, and two to three times as long as thick; and, as it occurs in New Jersey, always has some pubescence on the leaf-blades, at least near the base. The plant now under discussion has a dull white urn-shaped corolla 4–6 mm. long and 3–4 mm. wide and but one to two times as long as thick; and the leaf-blades are entirely glabrous even at flowering time. *V. atrococcum* with its strongly pubescent foliage, black berries, and greenish-white corolla is quickly separated. This distinct shrub of the pine-barrens is therefore here named and described as follows:

Vaccinium Caesariense sp. nov.

A shrub, 1–3 m. high similar in habit to *V. corymbosum* L. and *V. atrococcum* (A. Gray) Heller; much branched, the twigs green, warty, entirely glabrous. Leaf-blades ovate to elliptic-lanceolate, 4–7 cm. long, 1.5–2 cm. wide, entire, glabrous from the first, much paler beneath, short-pointed, round-tapering at base, half-grown at flowering time, the petioles 1–2 mm. long; flowers in short 6–12 flowered racemes, the ascending or spreading pedicels about equalling the corolla; bracts ovate-oblong, deciduous; calyx 5-lobed, glaucous, its broad lobes acute; corolla urn-shaped dull-white, 4–6 mm. long, 3–4 mm. wide, one to two times as long as thick, 5-toothed, the acute teeth erect or spreading; stamens 10 with hairy filaments; style slightly exceeding corolla; berries dark blue with a bloom, 6–8 mm. in diameter.

The following specimens, all from New Jersey, have been examined:

Tom's River, *Mackenzie* No. 2583, May 30, 1907, and No. 2780, July 28, 1907, same bush (type in Herb. K. K. Mackenzie; duplicates will be deposited in Herb. N. Y. Botanical Garden and Gray Herbarium); Lakehurst, *Mackenzie* Nos. 4544 and 4547, May 15, 1910; Tom's River, *Britton & Wilson*, June 30, 1900.

SHORTER NOTES

A MOUNTAIN ANYCHIASTRUM. When I described the genus *Anychiastrum* three species were known. These had been included in the two genera *Anychia* and *Paronychia*, and ranged through the coastal region of the Southern States, extending from North Carolina to Florida on the Atlantic side and from Florida to Louisiana on the Gulf side. I was considerably surprised, while studying the genus *Anychia* several years ago, to find specimens of an *Anychiastrum* mixed with those of *Anychia dichotoma*. The species may be described as follows:

Anychiastrum montanum sp. nov.

Plants annual or biennial, minutely pubescent. Stem branched at the base, the branches diffusely spreading, 0.5–2 dm. long, very slender, often wire-like, purplish, dichotomous: leaves numerous; blades spatulate to elliptic-spatulate, 4–11 mm. long, acute

or acutish; stipules silvery; calyx becoming 1.5 mm. long; sepals ovate to oblong-ovate, abruptly pointed at the apex, but not cuspidate, glabrous; utricle included.

In dry soil, mountains of southern Pennysylvania, Virginia, North Carolina, and Georgia.

Mountains near Hyndman, Pennyslyania, *Small*, August 19–23, 1890 (type).

Stony Man Mountain, Virginia, *Steele*, August 30, 1901.

Eagle Mountain R. R., Virginia, *Steele*, August 18, 1903.

Julius' Creek Mountain, Virginia, *Steele*, August 26, 1903.

Andrews, North Carolina, *Huger*, September, 1900.

Georgia, *Gray*.

Related to *Anychiastrum Baldwinii* from which it differs in its glabrous and larger calyx, the sepals which are without prominent apical cusps, and the eciliate leaf-blades.

J. K. Small

OF INTEREST TO TEACHERS

The Term Biology

Among the students from the dozen or more colleges registering yearly at Teachers College the term biology is so commonly misused that the question may profitably, perhaps, be raised here. Biology is used as synonymous with zoölogy. Such students speak of wishing to take "biology and botany"; of having had "more botany than biology," etc.

The Century and Standard dictionaries give no authority for such usage. The Century dictionary definition follows: (1) The science of life and living things in the widest sense; the body of doctrine respecting living beings; the knowledge of vital phenomena. (2) In a more special sense, physiology; bio-physiology; biotics. (3) In a technical sense, the life history of an animal, especially used in entomology. (4) Animal magnetism. The Standard dictionary differs only in the first of the four uses of the word, and biology is defined as (1) The science of life or living organisms treating of the phenomena (structure, growth, development, distribution and functions)

manifested by animals and plants or the causes of those phenomena; the study of living matter. An accompanying paragraph says "Systematic biology includes (1) zoölogy, (2) botany, and in some systems of classification, (3) anthropology.

Remarks by representatives of a limited number of teachers of botany have indicated an awareness of this misuse of the term, and a feeling that teachers of zoölogy are, perhaps unconsciously, responsible, through a loose use of the term in class room reference or through using the broader term in titles for courses which deal almost entirely with zoölogical subject matter.

On the other hand, one teacher of zoölogy feels that the real explanation lies in the fact that botanists are less aware of the progress in the zoölogical world, and limit illustration and amplification to the field of botany, while teachers of zoölogy draw freely from botany even in courses termed zoölogical, making the range of general subject matter as broad in courses in zoölogy as in those rightly called biology.

If this is so the remedy lies with the departments of botany. The *whole* field of biology is theirs, though they may actively labor in but part of it. If the fault lies in the attitude of the zoölogy departments the remedy is a simple one, and can be accomplished by an introductory definition of botany, with a few sentences showing its relation to the other divisions of biology.

In the August *Bulletin of the Torrey Botanical Club* Mr. Eugene P. Bicknell raises the question, "Have we enough New England blackberries?" Mr. Bicknell characterizes the blackberries as possessing "an extraordinary natural variability and undoubtedly, also, a facility in hybridizing which is perhaps not exceeded in any other genus of our flora." A list showing the probable hybrid derivation of many of the species is included.

The last "memoir" of the Torrey Botanical Club (XIV, part 2) is by Ormond Butler on Observations on the California Vine Disease. This disease, now on the decline, is found to be "due to some weakness in the functions of absorption and translocation of water becoming manifest when conditions favoring transpira-

tion are marked." It is therefore not due to the presence of parasitic organisms, but to what has been called a "physiological disorder."

In the June *School Science and Mathematics* Mr. J. P. Brown makes a plea for the catalpa which he claims has been the object of unjust discrimination by the government. *Catalpa bignonoides* is soft, at least when young; but Mr. Brown claims that the older growths of even that are hard. Catalpas are rapid in growth, and furniture has been made of trees sixteen years old which the writer feels rank the catalpa with the hickory, black walnut, and oak in hardness and beauty.

An article on "Golden New England" by Sylvester Baxter (*Outlook*, September 24) gives the New England states a right to share that term with the familiar "golden west." The article emphasizes particularly the work and influence of the Massachusetts State Board of Agriculture and the Massachusetts State College of Agriculture. Cape Cod is shown to be good for some thing beside cranberries; and the possibilities along the fruit line are enthusiastically set forth.

Owners of white birch trees are urged to examine them for the bronze birch borer. Forest birches are less affected by this pest, probably because woodpeckers hold the borer in check there. Infected trees show, according to Professor J. G. Sanders, of the University of Wisconsin, "dead tops and upper branches, which usually bear the leaves of the past season." Such trees "should be examined for the winding galleries in the wood beneath the bark and for ridge-like swellings on the younger green branches." To control the pest, "infected trees should be cut and burned before May 1. Trees must be completely destroyed, regardless of their value, if infected. . . . It is useless to cut off and burn the dead portions of the tree, since the beetles have already abandoned them for new, green wood."

Experiments have been made by L. L. Harter to determine the starch content of leaves dropped in autumn (*Plant World* **13**: 144–7). Leaves of *Liquidambar Styraciflua* were tested four times between August 17 and October 28. The leaves used in the last test were picked from the ground soon after falling; the greenest of the fallen leaves were used. The amount of starch varied little more than one per cent. (the lowest 10.33 per cent., September 15, and the highest, 11.47 per cent., October 23). The starch percentage was based upon the dry weight of the leaves. Previous workers had shown an increase of starch content with the development of the red coloring matter, and a decrease before the leaves are dropped. It is suggested that the cool weather of autumn may stimulate the production of oxidizing ferments, and inhibit the action of diastase, thus making possible an accumulation of starch in the leaves.

The methods, content, and purpose of biologic science in the secondary schools is the title of a paper in the January and February numbers of *School Science and Mathematics*. The author, Dr. G. W. Hunter (DeWitt Clinton High School, New York City), shows from questionnaires representing 276 schools in 34 states (1) an unexpected balance in the distribution of the number of science courses in the four high school years; (2) that the largest number of courses are to be credited to the biologic sciences (not including human physiology); (3) the development of a unified course in general biology and in elementary science in the first year of many high schools; (4) that most of such courses are year courses in each biological science (300 to 200 half year or shorter courses); and that morphology, physiology, ecology and relation to man share almost evenly the claim to emphasis (physiology slightly ahead) and utility or utility and science training outrank science training alone. The adaptation of the course to the pupil who does not go to college is also discussed and several answers are quoted in this connection.

NEWS ITEMS

At Cornell, Charles S. Wilson has been promoted to professor of pomology.

Mr. William E. Lawrence has been appointed instructor in botany at the Oregon Agricultural College.

Dr. C. F. Clark of the New York State College of Agriculture has accepted a position with the Bureau of Plant Industry.

Miss Edith M. Twiss (Ph.D. University of Chicago) has been appointed assistant professor of botany in Washburn College, Kansas.

William Dana Hoyt (A.B., University of Georgia, and Ph.D., Johns Hopkins) has been appointed instructor in botany at Rutgers College.

Professor Josephine Tilden has returned from her year in the southern Pacific and resumed work at the University of Minnesota.

Professor Guy West Wilson, formerly of Upper Iowa University, has been appointed assistant in vegetable pathology at the North Carolina Experiment Station.

Dr. Herman A. Spoehr, assistant in chemistry in the University of Chicago, has been appointed a member of the staff of the Department of Botanical Research of the Carnegie Institution of Washington. By the aid of chemical methods Dr. Spoehr is to investigate at the Desert Laboratory at Tucson certain problems in plant physiology.

The second annual summer session of the school of forestry of the University of Georgia, in charge of Prof. Alfred Akerman, was held during 8 weeks in June, July, and August in the long-leaf pine forests in the eastern part of Alachua Co., Florida. The school secured the use for the season of a large tract of cut-over timber whose owners expect to restore it and make it a perpetual source of revenue by rational methods of forest management. In addition to the regular instruction in forestry, a course of lectures on plant geography was given by Dr. R. M. Harper (Florida State Geological Survey). Students from five states attended.

Professor John Macoun (Sussex Street, Ontario, Canada) is issuing a series of Canadian mosses. The set will number 500 in all; the price is $8.00 a hundred. Some subscriptions are still open, although about half of the series have already been issued. Collectors may also secure for the sum of five dollars a collection of one hundred British hepatics. This set, which includes many rare species, is offered by W. H. Pearson (18 Palatine Road, Manchester, England).

In the recent forest fires which raged for many days in northern California, Oregon, Washington, Idaho, and Montana incalculable damage was done to the forested government reserves and a number of forest rangers lost their lives. Even the more conservative newspapers reported some dozen fire fighters as dead or missing and an equal number of other citizens as killed by the fires. The fires, many of which were thought to be of incendiary origin and aimed by spite or private greed against government rangers and reservations, became gigantic conflagrations miles in length in some parts of the northwest. The efforts of the fire fighters proved futile in several cases, and the fires were extinguished only by the long-delayed rains. The later forest fires in Minnesota and Canada have been equally severe—both in the number of lives lost and in the amount of property destroyed.

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NORTHWARD EXTENSION OF THE RANGE OF A RECENTLY DESCRIBED GENUS OF UMBELLIFERAE

By Roland M. Harper

One day in the fall of 1907 I was talking with Dr. Forrest Shreve about the peculiar distribution of certain coastal plain plants, and reference was made to *Oxypolis filiformis* (Walt.) Britton,* which ranges from North Carolina to Florida and Mississippi in the pine-barrens, with an outlying variety (*Canbyi* C. & R., Contr. U. S. Nat. Herb. **7**: 193. 1900) in southern Delaware. Dr. Shreve then remarked that he had found this species the year before on the Potomac River near Hancock, Maryland; but I assured him that the occurrence of such a pine-barren plant among the mountains so far north was highly improbable,† and that his specimens were more likely *Harperella nodosa* Rose, a plant of very similar appearance, but easily distinguished by its involucres, fruit, time of flowering, and various other characters. This it is true was then known only from two counties in the coastal plain of Georgia and two in the coal region of Alabama,‡ but the Alabama localities were along streams in the Cumberland Plateau, which is a direct continuation of the mountains of western Maryland, and a great many species of plants are common to the mountains of these two states.

Not wishing to leave this interesting matter unsettled, I asked

*Formerly referred to the genera *Oenanthe*, *Sium*, *Tiedemannia* and *Peucedanum*, in most cases with the specific name *teretifolia* (sm.).

†See Bull. Torrey Club **36**: 584 (first paragraph). 1909.

‡See Torreya **6**: 112–114. 1906. The genus (originally described in Proc. U. S. Nat. Mus. **29**: 441. 1905) was then known as *Harperia*, but this was found to be a homonym, and Dr. Rose soon changed it to *Harperella* (Proc. Biol. Soc. Wash. **19**: 96. 1906).

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Dr. Shreve to send me a specimen of his plant on his return to Maryland, which he did; and I deposited it in the herbarium of the New York Botanical Garden. It was collected July 13, 1906, on gravel beaches of the Potomac River 1½ miles west of Hancock, Md. Its oldest umbel was only a few days past flowering, so that the fruit characters were not well displayed, but it was evidently not *Oxypolis*, and I could see nothing to distinguish it from *Harperella*. It is considerably slenderer than my best specimens of the latter from Georgia, but no more so than those from the mountains of Alabama.

There the matter rested until February, 1910, when a most interesting sequel developed. In trying to verify the report (current in botanical manuals) of the occurrence of *Oxypolis filiformis* in Virginia, I traced it back to Torrey & Gray (Fl. N. A. 1: 630. 1840, under *Tiedemannia teretifolia*), who cited a specimen from Harper's Ferry (which was then in Virginia, but is now at the eastern corner of West Virginia), collected by Dr. W. E. A. Aikin. (This locality is given as the northeastern limit of the species in all editions of Gray's Manual between that time and 1869, when Mr. Canby discovered in Delaware the variety which now bears his name.) As Harper's Ferry is on the Potomac River in the mountains, like Hancock, and only 35 miles southeast of that place, I at once suspected that this plant must be about the same as Dr. Shreve's. On looking up the specimen in question, which is still preserved in the Torrey Herbarium, I found that what there is of it agrees very well with the one from near Hancock, even to being in the same immature stage. But it is such a poor specimen, that it is no wonder that no one ever noticed any essential difference between it and the specimens of *Oxypolis* among which it had presumably been lying for seventy years or so. The main stem had been bitten off (as was noted on the label), and curiously enough this was the case with most of the type specimens from Georgia; which would seem to indicate that cattle are rather fond of this plant. No indication of habitat was given on Dr. Aikin's label, but it is reasonable to assume that it was collected on the shore of one of the two rivers which come together at Harper's Ferry.

It seems rather strange that none of the numerous botanists who have explored the Allegheny table lands between Maryland and Alabama between 1840 and 1905 should have found this plant. It ought to be in the proper condition for identification on the Potomac River in August or September, and in the Virginias and East Tennessee a little earlier in the season. Whether the Potomac River plant is what I suppose it to be or not, it deserves careful investigation, for it is certainly something far out of its usual range, if not an undescribed species.

Postscript. The foregoing was sent in to Torreya on September 17th. Since then Dr. J. N. Rose, the author of the genus in question, has visited Hancock at my suggestion—after one of his assistants had been to Harper's Ferry in August without finding the desired plant—and he writes me that on October 5th he found a small patch of it just above high-water mark on the bank of the Potomac near that place, and collected flowering and fruiting specimens. He finds it very similar to my specimens from the mountains of Alabama, but is not sure now that those are identical with the original material from the coastal plain of Georgia. This implies that there may be two species of *Harperella* instead of one; a suggestion to which the considerable difference in habitat between the mountain and coastal plain plants lends weight.

ADAM IN EDEN OR NATURE'S PARADISE

Extracts by Jean Broadhurst

(*Concluded*)

CHAP. CVII.

Of Tobacco.

The Names.

I cannot understand that *Tobacco* was known before the diſcovery of the Weſt-Indies, and if ſo, it cannot be expected that I ſhould tell you by what name the Greek writers called it, they being deceaſed long before. It is called in Latin • • • *Nicotiana*

from *John Nicot* a French man who being an Agent in *Portugal* for the French King, ſent some of it to the *French Queen*, whereupon it was alſo called *Herba Regina*. The Indians call it Picielt and Perebecenue; but in moſt other languages it is called Tobacco.

The Places and Time.

Though that Tobacco which beareth away the Bell from the rest be (as I ſaid) called *Spaniſh Tobacco*, yet there is, for ought that I can learn, but very little Tobacco growing in *Spain* if any at all, but is brought thither out f the provinces of America * * * . It growith alſo in Braſil, which is another Country of the Weſt Indies, whenſe the ſeed being brought into England and ſown hath proſpered very well in thoſe ſoils that have been fruitful, and especially about *VVinscomb* in Glouceſtershire, where I think the planting of it is diſcontinued now, becauſe the ſtore that came from thence was a hindrance to the publick revenue coming in for the Custome of that which is brought from beyond the Seas; Howbeit it is continued in many Gardens though in no great quantity * * * .

CHAP. CXI.

Of Wood-bind, or Hony-suckle.

The Kindes.

THere are divers Sorts of Wood-binds, ſome that are winding about whatſoever ſtandeth next them; and for the moſt part, known throughout the Land; others are ſtrangers, or not ſo well known: there are divers that wind not but ſtand upright; all of which being ſummoned together, are in number eight. 1. Our ordinary Wood-bind. 2. The German red Honiſuckle * * * .

The Places and Time.

The firſt groweth abundantly in this Land, almoſt in every Hedge. The ſecond came out of *Germany*. The third out of *Italy*, both of which are ſet againſt our houſe-ſides, to run about the Windows, where they keep the Rooms cool, and make a goodly ſhew without. The laſt was found by Dr. Penny * * * .

The Vertues.

A Decoction made of the Leaves, or the Flowers and Leaves of Honey-ſuckles, with ſome Figs, and Liquorice added there unto is very effectuall for the expectorating of flegme from the Cheſt and Lungs * * * A Syrup made of the flowers is good likewiſe to be drunk * * * , being drunk with a little wine. Mr. *Culpepper* saith, that it is fitting that a Conſerve of the flowers of it, ſhould be kept in

every Gentlewomans House, for he knew no better cure for an *Asthma*, then this. • • • The flowers and leaves are of more use then the seed, yet they also help the shortnesse and difficulty of breathing, and cure the Hicket.

CHAP. CXV.

Of Polypodie.

The Forme.

COmmon *Polypody* of the *Oak* is a small Herb, consisting of nothing but Roots and Leaves, bearing neither Flower nor Seed. It hath three or four Leaves rising from a Root, every one singly by themselves, of about an hand breadth, which are winged, consisting of many small narrow Leaves, cut into the middle Rib, standing on each side of the stalk, large below, and smaller and smaller up to the top; not dented or notched on the edges at all, (as the Male Fern is) of a sad green color, and smooth on the upper side; but on the under side, somewhat rough, by reason of some yellowish spots set thereon. • • •

The Places and Time.

There hath been of late dayes, such a slaughter of Oaks, and other Trees, all over this Land, that should I nominate any particular place, I might thereby seem to be a deceiver. I shall therefore tell you in generall, that it groweth as well upon old rotten Trunks or stumps of Trees, be it Oak, Beech, Hazel, Willow, or any other, as in the Woods under them, and sometimes upon slated Houses and old Walls, as upon a Wall and side of an House, in *Adderbury* Churchyard, and many other places. • • •

The Signatures and Vertues.

The rough spots that are on the under sides of the leaves of *Polypody*, • • • is a sign that it is good for the Lungs • • •. The Herb • • • is good for those that are troubled with melancholy, or *Quartan* Agues, especially if it be taken in Whey, or honeyed water, or in Barley water, or in the Broth of a Chicken • • •. The fresh Roots beaten small, or the Powder of the dryed Root, mixed with Honey, and applyed to any Member that hath been out of joynt, and is newly set again, doth much help to strengthen it. Applyed also to the Nose, it cureth the Disease called *Polypus*, which is a piece of flesh growing therein. • • • *Crolius* saith, that because it hath such rough spots on the leaves, it healeth all sorts of scabs whatsoever by signature. • • •

CHAP. CXXV.

Of Marigolds.

The Kinds.

THerebe near upon twenty ſorts of *Marigolds,* yet I ſhall trouble you with no more than ten at this time. 1. The greateſt double Marigold. 2. The greater double Marigold. 3. The ſmaller double Marigold. 4. * * * 8. Jack an Apes on Horſe-back. 9. Mountain Marigold. 10. The wild Marigold.

The Places and Times.

All the Sorts afore-named are Inhabitants of the Garden, except the two laſt whoſe naturall places of being, may be diſcovered by their titles. They flower from April, even, unto Winter, and in Winter alſo, if it be warm * * *.

The Vertues and Signatures.

The Flowers of Marigolds, comfort and ſtrengthen the Heart exceedingly; * * * and little leſs effectuall in the ſmall Pox and Meazles, then Saffron. The Conſerve made of the Flowers, taken morning and evening, helpeth the trembling of the heart, and is very uſeful in the time of Peſtilence, when the air is corrupted. The Flowers either green or dryed, are uſed much in Poſſets, Broths, and Drinks, as a comforter of the Heart and Spirits, and to expell any Malignant or Peſtilentiall quality, that might annoy them, eſpecially amongſt the *Dutch,* where they are sold by the penny.

CHAP. CLV.

Of Daffodills.

The Names.

IT is called in Greek * * * that which benumbeth the hands of them that touch him * * * a *Pliny* and Plutarch affirm. And I take this to be the right Etymology of the word, though I am not ignorant of what the Poets have written hereof, eſpecially *Ovid,* who deſcribeth the tranſformation of the fair boy Narciſſus, into a Flower of his own Name, ſaying, * * *

As for his Body none remain'd, inſtead whereof they found
A yellow Flower with milk-white Leaves, new ſprung out of the ground.

The Forme.

The common Daffodill hath long, fat, and thick leaves, full of a slimy juyce; among which riseth up a bare thick stalk, hollow within, and full of juyce. The Flower groweth at the top, of a yellowish white colour, with a yellow Crown, or Circle in the middle. The Root is white, and of a Bulbus or Onyon fashion, yet not without divers effects by which it is propogated.

The Vertues.

Besides the Ornamentall use of *Daffodils* for decking *Garlands* and *Houses* in the Spring-time, it hath many Physicall properties • • • . And their qualities in drying are so wonderful, that they glew together very great wounds: as also rifts, gashes, or cuts that happen about the veins, sinews, and tendons. • • • Being stamped with Honey, and applyed Plaister-wise, they help them that are burnt with fire, and are effectuall for the great wrenches of the Ancles, the Aches and pains of the joynts. • • • The distilled water of Daffodils doth cure the Palsie, if the Patient be bathed and rubbed with the said liquor, by the fire, as hath been proved by that diligent searcher of nature, Mr. *Nicholas Belson.*

CHAP. CLXVIII.

Of the Apple-Tree.

The Forme.

FOr formality sake only, I shall tell you that the *Apple-Tree* doth generally spread his *Arms* and *Branches* more than the *Peare-Tree*, but riseth not to that height: the leaves are somewhat round yet pointed at the end, and dented about the edges, being greene both above and below; the *Flowers* are *White* with some *Red* many times mixed with it, especially about the edges. The *Fruit* is of divers sizes, formes, colour, tasts, &c: within which being ripe, be divers black *Kernells*: the *Root* goethe straight down with some branches running aslope.

The Vertues.

Though *Apples* eaten before they be ripe, or afterwards immoderately and without preparation, are very unwholesome; yet being gathered when they be ful ripe, and eaten with descretion they • • • make good digestion • • • . Being roasted and eaten with Rose-water and Sugar, as those of pleasanter kinds, as Pippins and Pearemaines, they are helpful to dissolve *Melancholly humours, to expell* heavinesse and procure *Mirth*, are good against the Pleurisy. • • • The Blossomes of apples • • • are usefull to those which are

troubled with a red *nofe* and face, they being diftilled * * * and the face wafhed morning and evening with the water. * * * A *rotten apple* applyed to *eyes* that are *blood fhotten* or *enflamed* with heat, or that are *black* and *blew* by any ftroake or fall, all day or all night, helpeth them quickly. * * *

CHAP. CCXXXII.

Of the *Haw-thorne.*

The Names.

IT being fo much controverted by Authors concerning the true Greek name of this Shrub, I fhall not undertake to decide it, but paffe it by without giving it any. * * *

The Kinds.

Antiquity was acquainted but with one fort hereof, yet now there be three taken notice of. 1. *The ordinary Haw-thorne.* 2. The low *Haw-thorne.* 3. *Englands Hawthorne,* which is in all parts like the common fort, but that it flowereth twice in a yeare, to the great admiration of fome wife and judicious men.

The *Signatures and Vertues.*

The powder of the Berries or the feeds in the Berries being given to drink in *Wine,* is generally * * * reported to be good for the Dropsy. The flowers fteeped three dayes in Wine, and afterwards distilled in glaffe, and the water thereof drunk, is a Soveraign Remedy for the Pleurisy, and for inward tormenting paines, which is alfo *signified* by the freckles that grow on this Tree. * * * The faid diftilled water is not onely *cooling* but *drawing* alfo, for it is found by good experience, that if Cloathes and Spunges be wet in faid water, and applyed to any place wherein *thornes, Splinters,* &c have entered and be there abiding, it will notably draw them forth, so that the *thorne* gives a medicine for its own pricking, as many other things befides do, if they were obferved. * * *

CHAP. CCXLIII.

Of Holly.

The Kinds.

THere may be faid to be three forts of Holly. 1. The Holly-Tree without prickles. 2. The Holly-bufh with prickly-leaves. 3. The Holly bufh with yellow Berries. Yet there be fome that affirme that with, and that without prickles, to be the

fame, having prickles when it is young and low, but when it is old and becometh great, it loseth all the prickles, except that at the end, and sometimes that also.

The Vertues and Signature.

• • • The decoction of the Rootes, but especially of the Barke of the Roote, as *Matthiolus* faith, being applyed by way f fomentation to those *places* that have been put *out of Joynt*, doth help them much • • •, and also to *consolidate* the *broken bones*. • • • The powder of the leaves dryed in an Oven and the pricks taken off, being drunk in Ale, is commended against the *Stitches* and *pricking paines* of the *fide*, which the prickles growing on the leaves to also signity. The Sap or juice that droppeth out of the wood being laid on the fire, being dropped into the *Eares* of those which are inclined to deafnesse, removeth that *infirmity*. • • • The lesser branches may be used to adorne *Houses* and *Churches* also, at Christmas as well in this as in former age without any superstition at all; these that are of a bigger and longer size are very necessary for Carters to make Whips, and the fame may be used as Riding-rods, as is known to every one; But that which may feeme a little strange, is this. One, that I knew, had a Holly-Tree growing in his Orchard of that bignesse that being cut down, he caused it to be fawed out in Boards and made himself thereof a *Coffin*, and if I mistake not left enough to make his wife one also: Both the parties were very corpulent, and therefore you may imagine the Tree could not be small.

CHAP. CCLXXXII

Of the Water Lillie.

The Forme.

THe great common white water Lilly hath very large round Leaves, in the shape of a buckler, thick, fat, full of juyce, and of a dark green colour, which, standing upon long, round, and smooth footstalks, full of a spongious substance, alwayes flote upon the water, seldome or never growing above it: from amongst which, there rise up from the Root other thick and great stalks • • • each of them sustaining one onely large white flower thereon, green on the outside, but exceeding white within, consisting of divers rowes, of long and somewhat thick, and narrow Leaves, smaller and thinner, the more inward they be, with many yellow thrumms or threds in the middle, standing about a small head, which after the leaves are fallen off, becometh like unto a Poppy Head • • •.

The Vertues.

* * * Both the simple and compound Syrupes, which are made of white Water Lilly flowers, and may be had at Apothecaries, are fine and cooling they allay the heat of choller, provoke Sleep, ſettle the brains of Frantick perſons * * * and ſo doth the Conſerve made of the ſaid flowers, the diſtilled Water of the ſaid flowers is very effectuall for all the diſeaſes aforesaid, both inwardly taken and outwardly applyed, and is very much commended for the taking away of Freckles, Spots, Sunburn * * * .

CHAP. CCXCI.

Of Anemonies

The Names.

IT is called in Greeke * * * from the Wind, becauſe it was anciently believed, that theſe kinds of Flowers did never open themselves, but when the wind did blow. * * *

The Kindes

To reckon up every particular Member of this exceedingly numerous Family, were almoſt an *Herculean Labour,* and is thought would gravell the moſt experienced Florist in *Europe,* and therefore, I shall not undertake it, but mention a few * * * 1. The purple Paſque flower. 2. The red Paſs flower. 3. The double Paſs flower. 4. The Paſs flower of *Denmark.* 5. The Wood *Anemone* or Wind-flower. 6. *Anemone* or Windflower with a tuberous Root. 7. The Fleſh-coloured Anemone. 8. The blew Anemone.

The Vertues.

There is ſome other uſe for *Anemonies,* beſides the ſetting forth of a garden, * * * Being made into an Oyntment, and the Eye-lids anoynted with it, it helps the *inflamations* of the *Eyes,* whereby it is apparent that the heat of one draweth out the heat of the other, as *fire* will fetch out the *fire,* when any one happens to be burnt, if they burn the ſame place a ſecond time * * * .

CHAP. CCCXXXIX

Of the Daisy.

The Kindes.

THere be divers ſorts of Daiſyes, as well in our Gardens, as growing beyond the Seas; yet becauſe the time will not permit me to enquire after them, I ſhall give you onely thoſe that grow naturally with us, they being of greateſt uſe for our intended.

purpose, and they are three: 1. The great Daisyes, which some call Ox-Eyes, and White Moons. 2. The middle sort of Daisyes. 3. The little Daisy.

The Places and Time.

The *first*, which is *Great Daisy, Oxe-Eye* or White-Moone, groweth almost every where by the hedge sides, in the borders of fields, and other wast ground, and many times in meadows, that lye anything high; the *second* groweth in the like places, but not so frequently; the place of the *third* can hardly be mistook, for it groweth upon every Common and other place almost: The two first flower in *May* and *June*, and then must be gathered, for they last not long; but the *last* beginneth to flower in the Spring, and holdeth on most part of the Summer.

The Vertues.

The Leaves of the great *Daisy* or *Maudlin wort* made up into an Oyntment, or Salve, with Wax, Oyl, and Turpentine, is most *excellent* for *Wounds*. • • • A Decoction made hereof • • • and the places fomented and bathed therewith warm, giveth great ease to them that are troubled with *Palsy, Sciatica*, or other Gout. • • • The *little Daisies*, when the greater cannot so well be gotten, may be used with good successe for all the purposes aforesaid, as also to help the Agues, the decoction of them in Wine or Water being drunk. It is said that the Roots hereof being boyled in milk, and given to little Puppies, will not suffer them to grow great.

The Conclusion.

AND *thus*, Gentle Reader, *by the assistance of the Almighty, have I gone through the generall* anatomy *of* Mans Body, *with the most usuall* Diseases, *and distempers of every part, from the* Crown *of the* Head, *to the* Sole *of the* Feet, *and appropriated such* Simples (*which I have in a manner* Anatomized also) *unto them, as I hold to be most convenient for the restoring them againe to their* Ease *and right* Temper. *I conceive that there is no body that understands my well-meaning endeavours, that will think, that such* Plants, *which are not expressed in this Worke, have not come with in my cognizance, and therefore I shall not need to be very* exact *in making any* Apology, *or laying down my* Reasons *for the* omission *of them: yet if there be any inclined to suppose so, let them know* that *I wilfully passed over some of them, and that there were some which the time (a thing which I have much wanted ever since I undertook this businesse) would not permit me to insert. And let them know also, that the present designe was not an* universall History *of* Plants, *for then how voluminous must we needs have been? but onely of those which are more usefull, and may be gotten at the* Apothecaries, *or* Druggists, *if they grow not neer every ones habitation: Yet perhaps*

hereafter, if Life, Health, and Leiſure ſhall give way, I ſhall with a little encouragement *deviſe ſome breef* appendix, *wherein I ſhall compriſe the names at leaſt, of all ſuch as are here wanting. But for the preſent, I ſhall bid the apprehenſive* Reader *to* Fare-well, *and I hope I ſhall not only to bid, but alſo be a means to make him ſo to doe.*

FINIS.

A Table of the Engliſh Names in which the Numbers are to be referred to the Chapters *

A Table†

* Selections only, including interesting names, synonyms, or spellings.
† Selections only; the numerous references given for freckles, headache, black and blue marks, heart comforted, etc., are interesting.

Hungar *to stay*, *chap.* 73.

Jaundies *yellow*, *chap.* 2, 5, 6, [30 others]

Memmory *to help*, chap. 5, 8, 7, 22 [and 5 others]

Neck *paind, and creek in it*, *chap.* 44. 273. 286

Stammering, *chap.* 64

Teeth *to fasten*, *chap.* 52, [and 7 others]

Teeth to *breede*, chap. 55.

Wearinesse, *chap.* 286, 343.

SHORTER NOTES

Notes on *Chrysobalanus Icaco* L.—A large portion of the sand dunes between the beach and Biscayne Bay opposite Miami, Florida, is covered by a growth of the Cocoa Plum. The plant there grows in approximately circular or somewhat irregular patches, the stems and branches radiately arranged and partially prostrate and partially curving upward. The flowers and fruits are borne mainly at the circumference of the patches, or near it. The plants produce fruits of three colors, namely yellow, purple, and red. The color of the fruits is always decided, and a given patch, so far as I have observed, produces but one color of fruit, each patch invariably bearing either yellow, purple, or red fruits. Except for this color-difference and a relative difference in the size of the fruits, the yellow the largest and the red the smallest, the plants appear to be identical.

J. K. Small

A New Species of *Proserpinaca*.—So peculiar are most of the plants of the New Jersey pine-barrens and so local are many of them that novelties are to be expected; but I must confess I was somewhat surprised to find that a large amount of material collected by me as *Proserpinaca palustris* L. was not that species, but a plant quite intermediate in character between it and *Proserpinaca pectinata* Lam.

As is well known, the first-named species has those emersed leaves which bear fruit in their axils oblong-lanceolate and merely serrate or serrulate, and the submerged leaves are pectinate or pectinate-pinnatifid; in the second named species all the leaves are strongly pectinate-pinnatifid, being divided to the rachis. The pine-barren plant has all the emersed leaves pectinate with broad margined rachis, the submerged leaves being pectinate-pinnatifid. The emersed leaves are in fact exactly half way between those of the two species above referred to.

The plant seems distinct and may be designated and described as

Proserpinaca intermedia

Glabrous, the stems decumbent at base, rooting, about 3 dm. high, simple or somewhat branched. Leaves of two kinds; blades of submerged ones pectinate-pinnatifid, divided to the rachis; blades of emersed ones oblong-lanceolate, pectinate, the stiff segments entire, acute, the central part of blade one-third of its width; flowers sessile in axils of emersed leaves, one to few together; sepals triangular, acute, convergent; fruit 4 mm. long and about as wide, sharply angled, the faces flat or slightly concave, wrinkled or rugose.

Specimens examined:

NEW JERSEY. Boggy soil along Pennsylvania right of way about half way between Barnegat Pier and Island Heights Junction, Ocean County, *Mackenzie* 2890, Sept. 1907 (type in Herb. K. K. Mackenzie; duplicates will be deposited in Herb. N. Y. Bot. Garden and Gray Herbarium);

GEORGIA. Wet pine barrens east of Douglass, Coffee County. *Harper* 1527, July 19, 1902; in small branch swamps in pine-barrens near Fitzgerald, Irwin County, *Harper* 2210, May 18, 1904.

KENNETH K. MACKENZIE

REVIEWS.

Osborne's Vegetable Proteins*

Dr. Osborne has done a great service to chemists and to those interested in the chemistry of plants by the publication of this monograph upon the proteins of vegetable origin. This subject has been his life-work and surely there is no one, here or abroad, better qualified to write upon it. The proof of this is the fact that the book is largely an outline of his own work and conclusions. Dr. Osborne treats first of the general characteristics of these proteins, the manner of preparation, their general physical and chemical properties, their decomposition products, and their classification. The last chapter is exceedingly interesting,

*Osborne, Thomas B. The Vegetable Proteins. Pp. 125. Longmans, Green, & Co., London and New York. 1909.

being a treatment of the physiological relations of the proteins of plants. In this place he introduces a discussion of the toxalbumins such as ricin, the exceedingly poisonous constituent of the castor-bean, and he also treats of the precipitin and agglutinin reactions of the proteins. At the end, the author has compiled a bibliography of more than six hundred titles, all dealing with the literature of the subject. This bibliography is sure to be indispensable to all future investigators in this field.

The botanist should be interested in this subject because any light that can be thrown on the composition and physiology of the proteins of plants, especially those from seeds, would help to clear up the important phenomena of germination and so forth. Furthermore, the isolation of sharply-defined and characteristic proteins from different plants and especially the fact that plants closely related botanically yield proteins that may be grouped together chemically, all go to show that morphological differences go hand in hand with deep-seated chemical differences, a supposition that ought to be studied much more closely than in the past. The newer immunity reactions of the blood-serum of animals ought to serve as a very delicate test for the relationship of plant constituents just as it has proved so useful in the study of normal and abnormal substances in the case of man and the animals.

To the chemist, Dr. Osborne's book should bring the results of an exact chemical study of the proteins, substances whose importance in both plants and animals can hardly be overestimated. The complexity and cell associations of those substances prevent their isolation in a pure state. Fortunately, however, the vegetable proteins can be prepared in a much greater state of purity than almost any of the proteins of animal origin. The result is that studies made upon proteins from plants are very likely to be productive of great advances in our knowledge of the structure and properties of proteins in general. The constancy of the composition and properties of certain of the plant proteins are so great as to lead one to think that definite chemical individuals are being studied. This is a reassuring thought to a chemist working upon proteins who, too often, is afloat in un-

known waters with the usual beacon-lights of chemical identity gone, I mean such data as melting points, crystalline form, and so on. Finally, it seems that the publication of work such as that of Dr. Osborne on the border-land of botany and chemistry may bring together the two sister sciences which, too long, have trod paths that are somewhat parallel but still too widely separated.

Ernest D. Clark

Columbia University

PROCEEDINGS OF THE CLUB

May 25, 1910

The Club met at the Museum of the New York Botanical Garden at 3:30 p.m. Dr. M. A. Howe occupied the chair. Twelve persons were present. The minutes of the last meeting, May 10, were approved.

A letter was read from the recording secretary of the New York Academy of Sciences in which he stated that he knew of no arrangements whereby the expenses of popular lectures given by the affiliated societies at the American Museum of Natural History could be met by the funds of the Academy. It was voted that the treasurer of the Club meet the bills incurred at the meetings of March 8 and April 12.

First on the announced scientific program was a paper entitled "Moss Notes" by Mr. R. S. Williams, of which the following is an abstract prepared by the speaker.

"*Leucobryum* or white-moss is so called from the structure of the leaf which is about like *Sphagnum* in having the chlorophyll-cells surrounded by hyaline, empty, porose cells, thus giving a whitish appearance to the moss. The fruit, of course, is very different from *Sphagnum*, much resembling that of *Dicranum*. Leucobryums are chiefly tropical although the type of the genus, *L. glaucum*, is widely distributed over Europe and in North America from Labrador to Florida and westward to the Mississippi valley. There have been over 120 species described, many of which can scarcely be considered as well defined. Out of some eighteen or twenty species credited to North and Central

America and the West Indies, I have been unable to distinguish more than seven or eight that seem fairly distinct. The fruit is very similar in the different species and of little specific value. The leaves consist largely of a very broad costa, several layers of cells in thickness, and this costa viewed in cross-section furnishes some of the best characters in separating the species. One of the most interesting features of the genus is the inflorescence. It has usually been described as dioicous and both Schimper and Braithwait figure male plants, three or four cm. high, growing in separate tufts. In the five or six species I have examined where antheridia occurred I have only found minute male plants one to rarely five or six mm. high and these were always growing on fruiting plants attached to tomentum enclosed by perichaetial leaves of infertile archegonia, or more rarely on the inner side of the tubulose stem leaves. It would be interesting to discover whether or not a distinctly dioicous inflorescence ever occurs, with male plants of large size."

The second paper of the afternoon was by Mr. E. D. Clarke on "The Rôle of the Oxidizing Ferments in Plants."

The following abstract was prepared by Mr. Clarke:

"The oxidizing ferments or enzymes are very widely distributed in both the higher and lower plants. Since all other enzymes seem to be produced by plants or animals for some definite purpose in the life of the organism, it was natural that speculation should arise regarding the function of the oxidizing enzymes of the plant. Little is known of the nature of these enzymes but their activity may best be described by saying that they act as accelerators of the ordinary processes of oxidation. It seems likely that the oxidizing ferments assist the plant in carrying on the oxidative processes of respiration by increasing the rapidity of the combination of oxygen with the oxidizable substances of the plant body. In the self-destructive processes of anaerobic respiration, these ferments probably play the same part. An illustration of the latter type is found in the case of the spadix of *Arum maculatum* which sometimes reaches a temperature of 20° C. above its surroundings. Certain of the higher plants and fungi change color very rapidly upon injury; the resulting ex-

posure of the tissues to atmospheric oxygen, in the presence of oxidizing enzymes, causing the oxidation of colorless substances to those of varied color. During the normal life of the plant it seems to be able to hold these enzymes in check, but after death or interference with its functions, the enzymes run riot; thus causing blackening and colorations of many sorts. The blackening of the foliage of many plants after a frost and the production of the red and gold of our atuumn forests may well be due to the excessive activity of the oxidizing enzymes. The color of black tea, the odor of valerian, the aroma of vanilla-beans, etc. have all been attributed to this same cause. The presence of these ferments in the roots of growing plants seem to enable them to destroy certain poisonous substances in the medium in which they grow. There is a disease of tobacco known as the 'mosaic disease' which is characterized by the checkered appearance of the leaves, these checkered places being yellow in color. Woods showed that rapid growth, produced by cutting back or by excessive manuring, often caused this disease which he attributed to an abnormal activity of the oxidizing enzymes. It has also been shown that they may cause the destruction of chlorophyll. Now, most of the lower fungi contain these enzymes, so the yellowing produced by their attacks upon green leaves may be due to their activity. It is evident then, that in the plant the oxidizing ferments have a physiological and also a pathological rôle that are not well understood but which deserve further investigation."

Dr. P. A. Rydberg reviewed the Monograph of *Sambucus* by Fritz Graf von Schwerm. This paper will be published at a later date.

Adjourned. PERCY WILSON,
Secretary

OF INTEREST TO TEACHERS

THE BOTANY UNIT

At the March meeting of the Commission on Accredited Schools of the North Central Association (including 13 states), the botany unit statement mentioned earlier in TORREYA was adopted.

"It has been the intent of the committee to prepare a statement that is sufficiently elastic to give adequate recognition to all good courses in high school botany, rather than to present a set line of procedure that must be followed by all. The work that is done should meet the needs of the pupils regardless of whether any work is to be done in any higher institution. Emphasis is placed upon the quality and quantity of the work done, and upon the preparation of the teacher, rather than upon the particular things that are to be done. To this end the report considers the following: I. The purpose and content of the course and the time to be given to it; II. Suggested plan of the course; III. The preparation that should be had by the teacher of botany; IV. A list of topics from which selection may be made to construct a course."

From the first topic four extracts are given:

1. "The ends to be sought through an elementary study of plant life include training in the scientific method of thinking particularly as relates to plant life, information and a more intelligent and a more active interest in natural phenomena in general, an elementary knowledge of fundamentals of plant life and a better understanding of those features and activities of plants that relate to every day affairs."

2. "In determining the content, order and treatment of topics in any indiviudal course, the needs and opportunities of the teacher and class should be dominant. * * * The quality and quantity of work done by the pupil, evidence of his ability to do accurate and reliable work, and adequate preparation by the teacher, rather than the specific content of the course are emphasized."

3. "There is presented a general plan of the 'synthetic course,' which the majority of the committee believes to be the best type, though it is not intended to restrict teachers to this type of course. This course embodies the elements of morphology of the great groups including the "lower forms" as well as the seed plants, of physiology with experiments upon plant activities, of ecology with emphasis upon class and individual field trips, including some acquaintance with local plants, of the relation

of plants to their habitat and to men, of food and timber supply, parasitism, disease, decay, soil replenishment, etc.

"An elementary consideration of the relations of plants to men as shown in plant and animal diseases, hygiene, agriculture, horticulture, erosion, decay, foods, fibers, etc., should be presented as an organic part of the study of botany. An adequate consideration of such separate applied sciences as agriculture, forestry, bacteriology, and horticulture should follow the general study of plants and animals."

4. "The time requirement of the course should be the equivalent of 180 periods of at least 40 minutes each; there should be two doubled periods per week for laboratory or field work, each of these doubled periods counting as one period in making up the total 180 periods."

The "suggested plan" of the course includes more material than any one year's work can present. The economic and practical phases are emphasized more throughout than in the report of the Committee of Education of the Botanical Society of America.* It is also stated that *any* of the following topics may serve as an introduction to the course, and lead directly to others of the group. The content is indicated below:

1. The structures of a typical seed plant—roots, stem, leaves, flowers, and seeds—and the kinds of work done by these parts.

How the plant lives—elementary, physiological experiments, absorption, root pressure, conduction, transpiration, photosynthesis, relation of functions to the structures by means of which they are performed.

The work of leaves.

The storage of food, its relation to the plant; its relation to men and other animals.

Seeds and seedlings; seed distribution; the establishment of new plants.

Acquaintance with some of the plants of the locality.

2. In addition to the topics just named, owing to seasonal advantage, preferences of the teacher, or needs of the pupils, the following will at times be found best in this connection, while in

*See Torreya 9: 60-63, 81-85. 1909.

other cases it will be found best to take up these topics after the consideration of the great groups.

Relation of plants to light, soil, water, atmosphere, gravity, contact, seasons.

Growth and reproduction.

Responses of different regions.

Artificial control and methods of improving agricultural and horticultural plants.

Forests, their uses, distribution, dangers, and preservation.

The study of types differs little in range from the recommendation of the Botanical Society. In the cryptogams field work is more definitely recommended; the species selected in each group are in most cases left to the teacher, but the life, habits, and distribution are included with the life cycle requirement. Bacteria in relation to crops, sanitation, and disease occupy a much more prominent part. The suggestions for gymnosperms and angiosperms are reprinted below:

1. Gymnosperms. Pine or spruce as a type; habit of tree, perennial nature, twigs and stems of different ages, age of tree, leaves and the evergreen habit, nature of the timber and its uses; two kinds of cones and the processes, time and structures involved in seed formation, nature of the seed, seed distribution, seedlings and the establishment of the new tree.

Names of other kinds of gymnosperms.

Gymnosperms as source of much of the world's lumber supply, chief regions of gymnosperm forests, preservation and extension of gymnosperm forests.

2. Angiosperms.

Life cycle as compared with the gymnosperms.

Types of stem, root, leaf and flower structure, with consideration of the special work, habits, and uses of each of these.

Nutritive and reproductive processes arranged so as to extend whatever work was done with seed plants at the beginning of the course. Work suggested at the outset that was not done in that connection may be included here.

Pollination and seed formation, number of seeds, seed distribution, seedlings, vitality of seeds, struggle for existence.

Structures and habits of plants of different regions.

Acquaintance with plants of the leading families in the local region.

Angiospermous forests (possibly delay the consideration of gymnospermous forests until this point), the local timber supply either from local forests or from others, enemies of the forests, elementary forestry problems, United States, State, and local private work in forestry.

Relation of plants to soil, water, light, temperature, gravity, and other environmental factors. Productive and unproductive soils and climates in relation to agricultural plants.

Diseases of plants and their significance. Artificial improvement of plants through cultivation, pruning, grafting, selection, and breeding.

The minimum preparation in botany for high school teachers of the subject was decided to be the equivalent of two years of college work. This work should include the general morphology of the lower and higher groups, elementary plant physiology and ecology; zoölogy, physiography, and a course in general bacteriology are desirable. The teacher should also have some knowledge of the purpose of botany in high school education and of current and desirable practice in teaching botany.

A porous clay cup for the automatic watering of plants is described by L. A. Hawkins in the September *Plant World*. Coleus plants were so grown for 180 days, and *Vicia Faba* plants from the seed to the late flowering stage. A container which is at least partially impervious was found to be better than the usual flower pot when the automatic watering cup is used. The plants were as vigorous as the control plants potted and watered the usual way. The advantages of the automatic device are that it maintains an approximately uniform soil moisture, and affords a simple method of measuring "water requirement and water loss of potted plants"; it also decreases the amount of attention required by potted plants and avoids the evils of alternately overwet and baked soil.

The September series of papers on the Paleontologic Record now running in the *Popular Science Monthly* deals with ontogeny and its relation to phylogeny. While the parallel between these is recognized as "a powerful aid to investigation" one paper warns the paleontologist not to assume too much for it. Another concludes that "the young give us very little which is not deceptive in reconstructing ancestral forms." The next paper in the series, however, says "When, however, the student of post-embryonic ontogeny compares the youthful stages of an individual with the adult of immediately preceding species of the same genetic series, the fact of recapitulation becomes at once apparent." The references are mainly zoölogical, but are well worth the botanists' perusal.

In a paper on the economics of waste and conservation in the *Atlantic Monthly* for September John Bates Clark calls attention to the fact the "common allegation is true that a small area of growing trees is capable of meeting the entire demand of the country for lumber", but he briefly adds "It will do so *at a price.*" The "one palliative fact about a monopoly of forests" is that "it would let new forests grow." Still Professor Clark is one of the last to present a plea for monopolies; and he presents the case for forests clearly when he says: "In another respect forestry is peculiar. Conservation not only permits, but requires, the use of the thing that is the object of care. . . . The scientific treatment of forests not only does not preclude a use of them, but positively requires it, and complete disuse is itself wasteful. Judicious cutting may go on forever without lessening the suppiy of timber which a forest contains, while refraining for all cutting is like letting fruit or growing crops go to decay. The trees that are ripe for use may give place to others which will keep up the succession and preserve forever the integrity of the forest; and few indeed are the public measures which would do as much for the general welfare as insisting on this amount of conservation."

NEWS ITEMS

William Henry Brewer, professor of agriculture in the Sheffield Scientific School of Yale University since 1864, died on November 2, in the eighty-third year of his age. Professor Brewer was first assistant on the geological survey of California from 1860 to 1864, had special charge of the botanical collections of this survey, and with Sereno Watson and Asa Gray wrote the "Botany of California," setting forth the botanical results of the survey in two quarto volumes. Several Californian species bear his name.

Dr. Melchior Treub, for many years director of the famous botanical garden at Buitenzorg, Java, and director of the Department of Agriculture for the Dutch East Indies, died at Saint-Raphaël, Var, France, on October 3. He was born near Leyden in 1851. Dr. Treub was editor of the important Annales du Jardin Botanique de Buitenzorg, beginning with its second volume in 1885 and retaining this editorship even since his retirement about a year ago. He was the author of many noteworthy botanical papers, covering a wide range of topics.

David Pearce Penhallow, the botanist and professor of botany at McGill University, Montreal, died October 26, on board the steamship Lake Manitoba bound for Liverpool. Professor Penhallow was born at Kittery Point, Me., May 25, 1854. He was graduated from the Massachusetts State College in 1873. In 1876, Professor Penhallow went to Japan and became professor of chemistry and botany in the Imperial College of Agriculture, Sapporo, Japan. He remained there until 1880, when he returned to this country and became instructor in physiological Botany in Prof. Gray's department of Harvard University. In 1882 he went to the Houghton Farm Scientific and Experimental Station as botanist and chemist. From here he went to McGill University in 1883. Professor Penhallow was a member of all the prominent botanical and natural history societies. He was vice-president of Section G of the American Association for the Advancement of Science. Among his numerous contributions are the Review of Canadian Botany from the First Settlement of New France to the Nineteenth Century, and various publications on paleobotany, plant anatomy and conifers.

TORREYA

December, 1910

Vol. 10 No. 12

ADDITIONS TO THE PLEISTOCENE FLORA OF NEW JERSEY*

By Edward Wilber Berry

No very promising localities for Pleistocene plants have thus far been discovered in the New Jersey area. The long-known and justly-celebrated Fish House clays in Camden county have yielded a considerable Pleistocene fauna, both vertebrate and invertebrate, and vegetable remains are not uncommon in the clays, but they are poorly preserved and difficult or impossible to determine. The writer has previously mentioned the presence at this locality of fragmentary maple leaves, seeds of the gum, and leaves of the linden, the latter occurrence having been described in a previous issue of Torreya.† Still other seeds are present but they have not been identifed.

Another New Jersey locality for Pleistocene plants was discovered by H. S. Gane in 1892 while working for the U. S. Geological Survey under the direction of Prof. W. B. Clark. The writer has not visited this locality, which is near Long Branch in Monmouth County, and such of the following notes as refer to this locality are based upon a small collection of the impure peat made at that time. The late Pleistocene age of these deposits near Long Branch has never been questioned, but there has been considerable divergence in the age assigned to the Fish House clays at different times. The following brief enumeration will give a good idea of the varying opinions which have been held regarding the age of these beds. Lea, Cook, and Whitfield regarded them as Cretaceous and of the same age as the Amboy clays; Cope at one time regarded them as Pliocene but later

*Illustrated with the aid of the Catherine McManes fund.

†Berry, Torreya 7: 80, 81. 1907.

[No. 11, Vol. 10, of Torreya, comprising pages 237–260, was issued November 17, 1910.]

concluded that they were Pleistocene; C. A. White in 1883 considered them post-Tertiary; Carville Lewis in 1884 considered them to be inter-glacial in age; R. D. Salisbury in 1894 regarded them as post-Pensauken but in 1895 and since has included them in his Pensauken formation; Pilsbry in 1896 says that they are inter-glacial or pre-glacial, probably the latter; Woolman in 1896 referred them to the Pensauken; and Shattuck in 1906 correlates them with the Talbot formation of Maryland. In the judgment of the writer the fossiliferous stratum at least is not older than the last interglacial and the probability is strong though unverified that it is post-glacial in age. The same remark is applicable to the fossiliferous peat near Long Branch which has yielded seeds and fruits of a number of different species of plants.

While the present collections are too small for any very definite conclusions regarding the climatic conditions which were prevalent in this latitude at the time these plants were living, it is significant that of the nine forms enumerated only three are species which in the recent flora range from Canada or New England to Florida These are *Juniperus virginiana*, *Hicoria glabra*, and *Vitis aestivalis;* and in all three cases the New Jersey Pleistocene forms are not as conclusively determinable as would be desirable. Of the remaining six species, *Quercus Phellos* is the only one which in the existing flora extends northward beyond this Pleistocene occurrence and then only for a few miles. The others all have their present day northern limits of range considerably south of their northern limits in the late Pleistocene. *Nyssa biflora*, *Vitis rotundifolia*, and *Taxodium distichum* do not range northward beyond southern Maryland at the present time, while *Pinus Taeda* is said to find its northern limit in Cape May County, N. J. *Zizyphus* is not represented at all in the northern or central coastal plain at the present time and is mainly tropical in its distribution. These facts though few in number and coupled with a certain lack of precision regarding the exact age of the deposits are of considerable interest since it is a well-known fact confirmed by abundant and conclusive evidence that in Europe the last glacial retreat was succeeded by a period during

which the climate was considerably warmer than it is at the present time as shown by the extension of various members of the existing flora for many miles to the northward of their present range.

The writer gratefully acknowledges his indebtedness to Mr. W. L. McAtee of the Biological Survey who through the courtesy of Dr. C. Hart Merriam has examined not only some of the present specimens but also other Pleistocene fruits and seeds collected by the writer. The Biological Survey in its extensive studies of the stomach contents of birds and mammals has accumulated large collections of fruits and seeds as well as experience in the identification of materials of this sort which is invaluable to the student of swamp deposits like so many of our Pleistocene plant-bearing horizons.

The following notes refer to the forms from New Jersey which have been recognized in the present study.

Taxodium distichum (Linné) Rich.

Holmes, Journ. Elisha Mitchell Soc. for 1884–85: 92. 1885.
Hollick, Md. Geol. Surv. Pli. & Pleist. 218, 237. *pl. 68.* 1906.
Berry, Torreya, 6: 89. 1906. Journ. Geol. 15: 339. 1907. Amer. Nat. **43**: 434. *f. 1, 2.* 1909. Amer. Journ. Sci. (iv), **29**: 391. 1910.

In the existing flora the cypress reaches its northern limit in southern Delaware and Maryland. Its range is becoming gradually restricted in the coastal plain as is shown by the sub-fossil occurrences of stumps north of the present limit of pure stands. In the late Pleistocene its range was much more extensive and fossil remains are found at numerous localities north of its present limit of distribution. The most northerly of these occurrences is the present record based upon cone-scales from near Long Branch, N. J., which is nearly 200 miles north of the present northern limit of the species.

Pinus Taeda Linné.

Berry, Amer. Journ. Sci. (iv), **29**: 391. 1910.

Cones and seeds of this species were recorded recently from the Pleistocene of both eastern and western Alabama. In the

existing flora the Loblolly pine becomes confined to the coastal plain north of the Potomac River valley, although to the southward it spreads over the Piedmont plateau and into the Appalachian region. It is found as far north as Cape May County, N. J., but the most northerly pure stands are in southern Delaware and Maryland on the sandy soils derived usually from the Pleistocene formations.

The present occurrence is based upon seeds from the swamp deposit near Long Branch, N. J., indicating that this species extended at least 75 miles farther northward in the late Pleistocene than it does at the present time.

Juniperus virginiana Linné (?).

Seeds of a *Juniperus* closely resembling those of this species occur near Long Branch, N. J. They are queried since from fossil wood in the possession of the writer collected from the

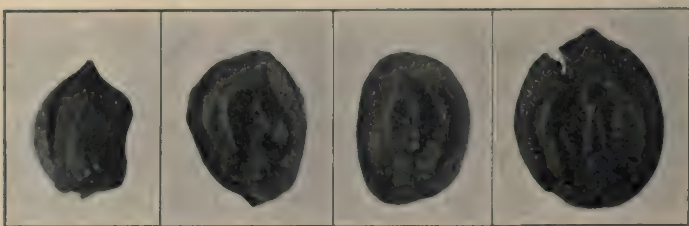

FIG. 1.—Nuts (×1) of *Hicoria glabra* from Long Branch.

Pleistocene of Maryland it is clear on anatomical grounds, that an extinct species of *Juniperus* was present in the northern coastal plain and these seeds may possibly be those of that species. The present identification was suggested by Mr. McAtee.

Hicoria glabra (Mill.) Britton (?).

Mercer, Journ. Acad. Nat. Sci. Phila. (ii) **11**: 277, 281. *f. 4, 5, 12, 16.* 1899. (*Carya porcina* Nutt.)

Berry, Torreya, **6**: 89. 1906. Journ. Geol. 15: 340. 1907. Torreya, **9**: 97. *f. 1–5.* 1909.

This species has a wide range in the existing flora of eastern North America and it is also frequently met with in the Pleistocene, having been previously recorded from deposits of this age in Pennsylvania, Maryland, Virginia, and North Carolina. The

present specimens, a number of which are here reproduced, come from near Long Branch, N. J. They resemble somewhat *Hicoria microcarpa* but are larger and thicker shelled. They also show some points of resemblance to *Hicoria villosa*, a comparatively recent segregate from *Hicoria glabra*. On the whole they are closest to the latter species especially to those fruits of the latter which are more symmetrical and not ficiform in shape. They are queried since it is possible that they may represent some intermediate or ancestral form.

Quercus cf. *Phellos* Linné.

Berry, Journ. Geol. **15**: 342. 1907. Amer. Nat. **41**: 694. *pl. 1. f. 1.* 1907. Amer. Jour. Sci. (iv), **29**: 394. 1910.

This oak is a common species of the Carolinian and Louisianian zones ranging from southern New York to Florida and Texas. It is a common fossil in the North Carolina Pleistocene and has also been recorded from the Pleistocene of Alabama. The present occurrence is based upon somewhat flattened cupules from near Long Branch, N. J., whose specific identity is not established with entire certainty. In the same deposits the writer has found a number of immature *Quercus* fruits four to five millimeters in diameter which may belong to this same species.

Vitis pseudo-rotundifolia sp. nov.

Seed relatively slender, curved, pointed: Surface slightly wrinkled: Inner face flat; outer face full and curved: Raphe well marked: Length 6.12 mm: Width 3.20 mm.: Thickness 2.25 mm.

This species of *Vitis* is distinct from any existing species known to the writer. It resembles in its general proportions the seeds of *Vitis rotundifolia* Michx., but is much smaller and less rugose. If it represents an ancestral form of this species, as is not improbable, the range in the late Pleistocene was more extended than at the present time since *Vitis rotundifolia* finds its present northern limit in southern Maryland almost 200 miles south of the oc-

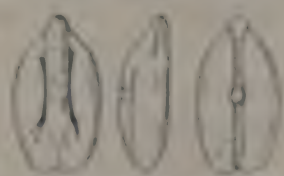

Fig. 2. — Three views of seed (× 3) of *Vitis pseudo-rotundifolia* from Long Branch.

currence of **Vitis pseudo-rotundifolia** which is at Long Branch, N. J. Mr. McAtee who kindly compared this seed with the existing species reported that it was different from any of the existing species of *Vitis*.

Vitis cf. *aestivalis* Michx.

The summer grape is widespread in the existing flora of eastern North America ranging from southern New England to Florida along the Atlantic coast. The specimens from the Pleistocene near Long Branch, N. J., are seeds which agree fairly well with the existing species with which they have been compared.

Nyssa biflora Walt.

Hollick, Md. Geol. Surv. Pli. & Pleist, 235. *pl. 69. f. 5.* 1906.
Berry, Torreya. **6**: 90. 1906. Journ. Geol. **15**: 345. 1907. Amer. Journ. Sci. (iv), **29**: 398. 1910.

This species in the recent flora appears to be confined to the coastal plain ranging from Maryland to eastern Texas. According to Coulter & Evans it occurs in New Jersey, and Sudworth records it from the Piedmont plateau in Montgomery County, Maryland. However, the botanical survey of Maryland which has been completed recently failed to discover this species except in the river swamps of the southern "Eastern Shore" which it would seem marks its present northern limit. Britton & Brown state that perhaps it intergrades with *Nyssa sylvatica* which extends northward to Maine and Canada, but in any case the seeds are distinctive and it is upon the seeds that the present record at Fish House, N. J., is based. Gum seeds have been previously mentioned by the writer as frequent in the Fish House clays but these have never been specifically identified. As a fossil this species has been previously recorded from Maryland, Virginia, North Carolina, and Alabama.

Zizyphus sp.

The remains consist of a flattened drupe with a smooth stone from Long Branch, N. J. They are larger and more massive than those of the existing *Zizyphus obtusifolia* of the southwestern United States and differ from any of the existing species with which they have been compared. There is room for some doubt

regarding the correctness of the identification; the remains are, however, more like those of *Zizyphus* than anything else in the existing flora with which they have been compared either by the writer or by Mr. McAtee of the Biological Survey.

Johns Hopkins University, Baltimore, Md.

TWO INTERESTING NEW ENGLAND PLANTS*

By H. A. Allard

During a brief visit around Oxford, Massachusetts, in September, 1910, I was much impressed with the pretty Spiked-Loosestrife (*Lysimachia terrestris* (L.) B. S. P.). At this season in certain situations many plants had become strikingly conspicuous from the great numbers of deep red, elongated bulblets which were growing from the axils of the numerous, more or less distinctly whorled leaves. These bulblets, which morphologically are suppressed branchlets, may reach a length of ¾ of an inch, are very pointed and deep red in color. Late in the season these bulblets are very easily detached and thickly strew the ground beneath the plants.

In June and July the Spiked-Loosestrife produces an abundance of small, brown-marked, yellow blossoms in a terminal, pyramidal raceme. The plants, however, are far more noticeable in autumn when they have become reddened with their axillary bulblets, which at first sight resemble peculiar little fruits more than anything else. Conditions of environment seem to determine whether the plants will produce these bulblets abundantly or not. Many botanical descriptions of *Lysimachia terrestris* make little or no mention of this well-marked habit of the plant to produce axillary bulblets.

The Narrow-leaved Laurel (*Kalmia angustifolia* L.) is a low, evergreen shrub thriving in pastures throughout New England. During its growth it forms small tufts which, in the course of years, if the conditions of growth have been uniform, may form great circular areas many feet in diameter. This peripheral extension is probably accomplished by a process of budding from underground shoots.

*Illustrated with the aid of the Catherine McManes fund.

FIG. 1.—Capsule-clusters of *Kalmia angustifolia* of successive years.

It is interesting to observe how persistently this Kalmia retains the seed capsules of each season's growth.

If fruiting branches of this little shrub be carefully examined, it will be noted that several clusters of small, closely crowded capsules appear along the stalk, as shown in the accompanying photograph. Each cluster is the growth of a single season, and as the capsules are strongly persistent, clusters several years old may be present. The accompanying illustration shows two stalks with a few capsules still adhering from the growth of the season of 1907, together with clusters of each succeeding year including the present season of 1910. The uppermost cluster of capsules represents the present season's growth, and is of a rich, reddish-brown color, which becomes a dull, faded grey in older clusters longer exposed to weathering influences.

The beautiful, showy rose-red flowers of early summer are closely arranged in whorls of little corymbs in the axils of the persistent, last year's leaves. Later in the season following the appearance of the clustered capsules these subtending leaves are shed and the leafy shoot of the present season surmounts the topmost capsule cluster, as shown in the photograph. These new leaves persist through the winter, and from their axils will appear the flowers and seed-capsules of the next season.

Kalmia angustifolia flourishes in open, damp situations throughout New England. In certain open hilly pastures it becomes especially luxuriant. The rare beauty of its clustered, deep rose-red flowers in early summer together with the green, persistent leaves, the neat, compact, massing habit of growth, and its hardy adaptability should highly recommend this Kalmia to cultivation.

DEPARTMENT OF AGRICULTURE

REVIEWS

The Origin of the Coco Palm*

Having described a new species of *Glaziova*, founded upon a specimen growing in the Botanical Garden at Buitenzorg, but

**Glaziova Treubiana* nouvelle espèce de Cocoïnée, avec observations sur le genre Cocos. Par O. Beccari. Annales du Jardin Botanique de Buitenzorg, 2e Série, Suppl. III. Pp. 791–806. Plate and text figures. Leide, 1910.

whose native country is unknown, and having recorded some observations on the flowers of *Cocos nucifera*, Dr. Beccari devotes the last half of his paper to a discussion of the disputed question of the original home of the latter palm.

On this point the generally accepted opinion had attributed an Asiatic origin to this palm, a view accepted by De Candolle in his classic "*Origine des plantes cultivées.*" But in 1901, Mr. O. F. Cook, in a paper published in the seventh volume of the Contributions of the United States National Herbarium, put forth a well supported argument in favor of "the alkaline regions of the Andes of Colombia,—in valleys remote from the sea," as the cradle of the cocoanut. From both these views Dr. Beccari dissents.

He calls attention to the fact that, in determining the place of origin of a plant or an animal, we must consider not alone the present configuration of the earth's surface, but we must go back at least to the tertiary period, when the ancestors of the organic forms of today were assuming their development (*s'etre effectuée la plasmation*). It is evident that during that period great geographical changes were effected in the Pacific basin in connection with the elevation of the Andes.

The weightiest argument in favor of the American origin of the Coco Palm is drawn from the fact that, with the exception of the African oil palm, *Elaeis guineensis*, all the other members of the tribe are indisputably American. But none of them are, Dr. Beccari claims, truly related to *Cocos nucifera*, which is strictly monotypic, as it is also regarded by Mr. Cook. Moreover, all these relatives, more or less remote, inhabit regions on the eastern side of the Cordilleras, which immense barrier separates them from the present actual center of distribution of the Coco Palm.

The author names several other palms whose presence in America is best accounted for on the hypothesis of the existence, in a former geological age, of a more extensive land area in the Pacific, than now remains.

While the Coco Palm may, under favorable circumstances, live at places distant from the sea, essentially it is a plant of

maritime shores. That it does not occur on some shores where it might naturally be expected is attributed to enemies, among whom, it may be, even primitive man is to be counted. It cannot succeed in forests because it is unable to compete with other trees, and it is there without means of dissemination, for its nuts fall directly at the foot of the tree without any chance of being carried to a distance. On the seashore, favored by its tolerance of salt water, it encounters little competition, and the ocean currents bear its nuts afar.

A further argument is drawn from the singular association existing between the Coco Palm and the Robber Crab. This great crustacean, *Birgus latro*, a foot and a half in length, and terrestrial in habit, can exist only where the cocoanut flourishes, and is found only in the Asiatic and Pacific islands. Like its relative, the Hermit Crab, its soft body is unprovided with a protective covering, and to supply this want the *Birgus* encases its abdomen in the empty shell of a cocoanut, to the cavity of which its dimensions exactly correspond. Even that it climbs to the tops of the palms for the purpose of detaching the nuts, long regarded as a fable, has been recently ascertained to be a fact. Its buccinal claw has developed into a ponderous hammer, wherewith it staves in the germinal end of the cocoanut and extracts, bit by bit, the nourishing meat. To this rich food it is due that its abdomen is a reservoir of oil.

These modifications, so extraordinary both in habits and in organs, and found in the *Birgus* alone, of all the crab family, could have been acquired by association with no other plant than the Coco Palm, and to account for their acquisition demands an immense period of time. And since Polynesia is the native home of *Birgus latro*, it is logical to conclude that it is likewise that of *Cocos nucifera*.

The author, therefore, believes that the Coco Palm acquired its specific form in Polynesia, and that its distribution therein was effected by the ocean currents, whose efficiency for that purpose is so vigorously combated by Mr. Cook. In Asia and in Malasia it has only gained a foothold under the protection of man.

S. B. Parish

PROCEEDINGS OF THE CLUB

October 11, 1910

The first fall meeting of the Club was held at the Museum of Natural History. Vice-president Barnhart occupied the chair. Eight persons were present. Mrs. M. E. Soth, of Manitou, Colorado, was elected to membership.

The scientific program consisted of an illustrated lecture on "European Influences in the History of American Botany" by Dr. John Hendley Barnhart.

Jean Broadhurst,
Secretary pro tem.

October 26, 1910

The meeting of October 26 was held in the museum building of the New York Botanical Garden at 3:30 P.M. Eleven persons were present. Vice-president Barnhart occcupied the chair.

The minutes of the meeting of October 11 were read and approved. It was then voted to accept the resignation of Frederick S. Beattie, of Tilton, N. H.

The scientific program consisted of informal reports on the summer's work. Mr. Norman Taylor, chairman of the field committee, gave an account of the Decoration Day excursion by members of the Club to Saugerties, Ulster Co., N. Y., of a personal collecting expedition to Bean Run, Luzerne Co., Pa., and of the "Symposium" in cooperation with the Philadelphia Botanical Club, which was held this year at Farmingdale, Monmouth County, New Jersey, July 2 to July 9. Farmingdale is north of the pine-barren region and its soils are largely Cretaceous marls and clays, but it was of interest to find in this region, especially on the low hills, northward extensions of the range of certain characteristic pine-barren plants.

Mrs. N. L. Britton gave a report of the summer meeting of the Vermont Botanical Club, which was held at Woodstock, Vermont, during the first week of July.

Mr. F. J. Seaver remarked briefly concerning his visit to the mountains of Colorado, where he made collections of fungi during the month of September.

Dr. John Hendley Barnhart reported upon his visit to Europe during May, June, and July, including an account of the International Botanical Congress at Brussels, to which he was one of the Club's delegates. He also related some of his experiences and results in purchasing books for the library of the New York Botanical Garden and in a few hours of plant-collecting in the vicinity of Oberammergau.

Dr. P. A. Rydberg stated that for the first season in twenty-six years he had not collected a single plant, and in this connection he briefly reviewed some of his earlier field-work.

Adjournment followed.

Marshall A. Howe,
Secretary pro tem.

OF INTEREST TO TEACHERS

Kipling on the Old Herbalists

In Kipling's Rewards and Fairies* is a musical poem, "Our Fathers of Old", which shows that Kipling must be familiar with some of the old herbals. The first stanza follows:

"Excellent herbs had our fathers of old—
Excellent herbs to ease their pain—
Alexanders and Marigold,
Eyebright, Orris, and Elecampane.
Basil, Rocket, Valerian, Rue,
(Almost singing themselves they run)
Vervain, Dittany, Call-me-to-you—
Cowslip, Meliot, Rose of the Sun.
Anything green that grew out of the mould
Was an excellent herb to our fathers of old."

As in Adam in Eden, "simply and gravely the facts are told"; yet after all,

"Wonderful little, when all is said,
Wonderful little our fathers knew.
Half their remedies cured you dead—
Most of their teaching was quite untrue."

*Doubleday, Page and Co., Garden City, New York. 1910.

In the October issue (page 236) Professor Macoun's address was given as Ontario instead of Ottawa.

Teachers in the southwestern states will be interested in The Trees and Shrubs of San Antonio and Vicinity. This little booklet gives the woody plants of the region, with a brief, non-technical description, and a short paragraph on uses and habitats. There is no key, but, as the author says, any plant may be traced to the family by any general flora; and as the plants are grouped by families, its further identification is a simple matter. The common names are emphasized by being placed first.

Professor Bessey (*Science*, November 11) has made a new estimate of the number of species of plants "with which botanists have enough acquaintance to permit of their systematic arrangement and enumeration. The result is that roughly speaking we may say that there are now known about 210,000 species, distributed as follows: Myxophyceae (Blue Greens) 2,020, Protophyceae (Simple Algae) 1,100, Zygophyceae (Conjugate Algae) 7,000, Siphonophyceae (Tube Algae) 1,100, Phaeophyceae (Brown Algae) 1,030, Carpophyceae (Higher Algae) 3,210, Carpomyceteae (Higher Fungi) 63,700, Bryophyta (Mossworts) 16,600, Pteridophyta (Ferns) 2,500, Calamophyta (Calamites) 20, Lepidophyta (Lycopods) 900, Cycadophyta (Cycads) 140, Strobilophyta (Conifers) 450, and Anthophyta (Flowering Plants) 110,000.

An article on conserving the purity of the soil (*Science*, Oct. 21) by H. L. Bolley emphasizes the necessity of keeping soils, especially for cereals, in a sanitary condition. The author concludes with the following paragraph:

"If, on the other hand, you declare for careful seed selection in all cases, careful seed disinfection at all times, the formation of a well-aerated but compacted seed bed, and for as extensive a rotation of crops of as wide-spread character as possible, you of the new dry land regions of the west have the greatest possible

opportunity to prove to the world that it is not necessary to lose a crop of such importance as linseed from among your rotations, nor is it necessary that your wheat yields should fall from the now promising ones of thirty to sixty bushels per acre to the general average of twelve to fifteen."

The May *Bulletin of the Torrey Botanical Club* contains an article by Harry B. Brown on the genus *Crataegus*, with some theories concerning the origin of its species. Prior to 1896 about one hundred North American species of *Crataegus* had been described; since then eight hundred and sixty-six species and eighteen varieties have been described. Three explanations might be given: that the early systematists were not careful workers; that the number of species has multiplied greatly recently; that the older species are hybridizing. Opinions from leading systematists are given. Mr. Brown thinks that the present different concept of species is responsible for part of the increase; and the rest may be accounted for by (1) the decrease in forested land and the consequent increase in the number of *Crataegus* plants now occupying the space and (2) by the fact that many of the present forms seem to be hybrids.

In the *Plant World* for July an unusual formation of adventitious roots is described by F. A. Wolf. "During a storm the trunk of this large hackberry tree had been split and the fallen portion was subsequently removed. At a point about eight feet above the ground and a little above the broken edge of the tree a cluster of fibrous roots were formed. Some of these grew to be over a foot in length and larger in diameter than a lead pencil." Mr. Wolf says that there "is no doubt that no such phenomena would be expected to occur in a normal healthy tree, yet this is not an adequate explanation for their formation. Certain it is that the vitality of the tree had been seriously impaired and it responded to th's abnormal condition by a peculiar development of roots. It would seem, too, that such a growth might better be expected in a more humid region and not under semi-arid conditions such as prevail about Austin. This is one of the singu-

lar, natural phenomena the reason for which can only be a matter of conjecture."

The American Phytopathological Society calls attention to "two dangerous European plant diseases: the potato wart, caused by *Chrysophlyctis endobiotica* Schilb., and the blister rust of white pine, caused by *Peridermium strobi* Klebahn. The former has been discovered in Newfoundland. The latter has been widely distributed in nine of the United States and in the Province of Ontario, but is now believed to have been eradicated." The Society regrets that through the absence of any national regulation in either the United States or Canada both governments are powerless to prevent the continued introduction of these and other dangerous diseases, or their transference from one country to the other; and promises to support all legislation in both the United States and Canada looking toward the inspection, quarantine, or prohibition from entry of all plant material liable to introduce these or other dangerous diseases or pests. The Society feels the need of immediate action, as "every law of biology and all experiences with plant diseases and pests indicate that, in a new climate, with new varietal and specific hosts and with an entire continent in which to spread, both diseases will reach a degree of virulence unknown in Europe."

The *Outlook* for November 19 gives the Forest Service "estimate of the loss in the National Forests in Montana and Idaho due to the fires and hurricane of August 26 last. The estimate puts the total amount of destroyed timber at over six billion board feet, or between one and two per cent. of the total stand of National Forest timber, the area burned over exceeding one and a quarter million acres. This announcement has caused caustic comment by the opponents of the Federal administration of forests. Some attempt has been made to connect the matter with the 'New Nationalism', as showing that there is no necessity for such an issue of centralization. Apparently, in the minds of these critics, the fires would not have occurred if the forests had been State and not National Forests!" Drought, the quan-

tity of inflammable material, the inaccessible character of the country, and unusually high winds all added to the difficulties faced by the not incompetent but *inadequate* forest service. A much larger sum should immediately be appropriated by Congress for this work.

NEWS ITEMS

L. H. Pennington, instructor at Northwestern University, has recently been made assistant professor of botany at Syracuse University.

The annual meeting of the American Society of Naturalists will be held (Dec. 28–30) at Cornell University. Dr. D. T. MacDougal will deliver the presidential address.

A drinking fountain, the memorial to Dr. James Fletcher mentioned some months ago in TORREYA, has been erected at the Central Experiment Farm, Canada.

Professor W. A. Henry, professor emeritus of agriculture of the University of Wisconsin, is planning to spend a year investigating agriculture in Europe.

Dr. William A. Cannon of the Desert Laboratory of the Carnegie Institution is spending a year abroad, visiting European botanical gardens and African deserts.

Dr. W. A. Murrill, of the New York Botanical Garden, has just returned from a European trip taken primarily to examine type specimens of fungi.

Dr. Ormond S. Butler (Ph.D. Cornell, 1910) has been appointed instructor in horticulture at the College of Agriculture of the University of Wisconsin and the Wisconsin Agricultural Experiment Station.

Letchworth Park, the thousand acre park given conditionally to the state of New York in 1907, became the possession of the State upon the death of the donor, William Pryor Letchworth, on December 1.

The sixty-second meeting of the American Association for the Advancement of Science, and the ninth of the "Convocation

week" meetings, will be held in Minneapolis, December 27 to 31, 1910, at the invitation of the University of Minnesota. The Botanical Society of America and various affiliated societies meet as usual at the same time. Owing to Professor Penhallow's death, Section G will convene under Vice-president R. A. Harper. Further information may be obtained from the permanent secretary, Dr. L. O. Howard, or from the secretary of Section G, H. C. Cowles, University of Chicago.

In the Brooklyn Institute prospectus for 1910–1911 two courses of lectures are announced in botany. They are given by Dr. C. Stuart Gager, the director of the new Brooklyn Botanic Garden. The first is a series of ten illustrated lectures on plant physiology given on Saturday mornings beginning October 15, but omitting November 26, December 26, and 31. The course will deal with modern views and interpretations of various fundamental life processes of plants. The second course is on the teaching of botany, and will be given on Saturday mornings beginning on March 4, but omitting April 5. This is intended primarily for teachers (including teachers of nature work) and those intending to teach. Readings will be assigned in the literature of the pedagogy of botany, and a comprehensive bibliography may be secured. All the lectures begin at ten o'clock, are open to teachers in the public and private schools, and will be held in the Brooklyn Academy of Music.

INDEX TO VOLUME X

New names and the names of new genera and species are printed in **boldface type**.